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THE  
**South African  
MINING JOURNAL**

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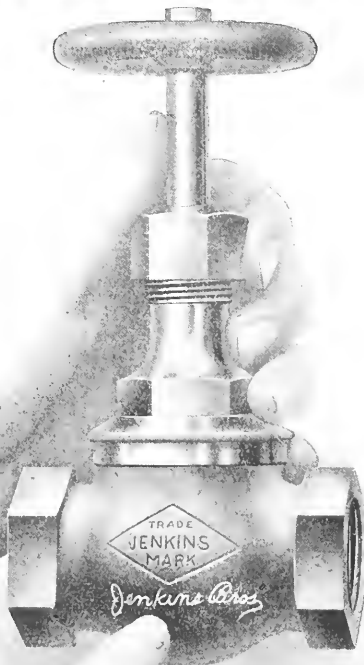
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# Mining Journal,

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South African Mines, Commerce and Industries.

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Notes and News ... ..	663
Topics of the Week:	
British Trade after the War ... ..	665
American Capital for South Africa ... ..	666
The Revised Water Supply Scheme ... ..	666
South African Sulphate of Ammonia Industry ... ..	667
Future Producers of the Far East Rand.—II. East Rand Mining Estates ... ..	668
Cost of Oil Shale Treatment ... ..	669
A Year of Madagascar Mining ... ..	670
The Position of the E.R.P.M. ... ..	671
Application of Electric Power to Rand Mining Work ... ..	672
The Conglomerates of the Witwatersrand ... ..	673
Correspondence and Discussion:—"Geological Truth Tablets," "British Trade after the War" ... ..	675
Economic Geology and Mineral Industry of South-West Africa ... ..	676
February Output in Detail ... ..	677
Rand Earth Tremors Committee's Report.—III. ... ..	678
The Week in the Sharemarket ... ..	680
The Week in the Mining Material and Engineering Trades ... ..	681
The Distribution Plant of the Johannesburg Municipal Electric Supply System.—V. ... ..	683
Company Meetings: New Transvaal Chemical Co. ... ..	684

## Notes and News.

We are authorised to announce that Colonel Dalrymple has resigned his seat on the board of **Springs Directorate**. Springs Mines, Ltd., and that his place has been taken by Mr. S. B. Jod. Many rumours to this effect have been current, but this important change in the directorate has only now taken place.

The reserve shares of the Transvaal Coal Trust have been taken up by the Consolidated Mines Selection, Limited. It will be remembered that the capital of the Coal Trust is £550,000, in £1 shares, of which 545,760 shares have already been issued.

Luipaardsvlei shareholders are to be congratulated on the appearance of another dividend declaration, this time of 6d. per share. This is the second dividend declaration since last December, when, it may be remembered, 9d. per share was distributed.

The big meeting at the Town Hall last night gave unmistakable emphasis to the views of Johannesburg on the University question. Speaking at the last meeting of the Chemical, Metallurgical and Mining Society, Mr. H. A. White (vice-president) said: "I noticed in the *South African Mining Journal* of this week an article, in the course of which the editor pointed out that the public of this town looked to the technical societies for some indication of their view as to the vocation of the Universities. In view of the useful work accomplished by the South African School of Mines and Technology since its inception, and the fact that the Rand is not merely the Industrial centre of South Africa, but also one of the principal places in the world where scientific and technical knowledge has the most vigorous practical application, it is to be hoped, in the interests of the whole Union, that whatever scheme of University Education is adopted for South Africa, the exceptional advantages which Johannesburg offers in this respect will be fully utilised by carrying out the training in all branches of applied science in this most favourable environment. It is the more necessary to insist on this in view of the increasing dependence of the prosperity of South Africa upon the application of scientific training and knowledge to the utilisation of its vast natural resources." Dr. W. A. Caldecott (past president) said: "I have much pleasure in supporting Mr. White's remarks, which I have no doubt are in accordance with the views generally held by members of this society." The President, Mr. J. E. Thomas, and Mr. Laschinger supported these remarks.

The Fourth Annual Competition for the Underground Workers' Shield, presented by the Chemical, Metallurgical and Mining Society of South Africa, will be held at the City and Suburban G.M. Co., Ltd., on Sunday next, the 19th inst. The mine is situate at the southern end of End Street, which is passed by all Malvern, Jeppe, Troyeville, Fairview, Kensington, or Wolluter trams to and from the Market Square every few minutes. A Red Cross flag flying at the mine headgear will denote the spot. Teams have been entered by the following, and as the result of a ballot, will compete in the following order:—1. Crown Mines No. 5 Shaft; 2. Village Deep, Ltd.; 3. Wolluter G.M. Ltd.; 4. Crown Mines No. 4 Shaft; 5. Crown Mines No. 4a Shaft. The competition will commence at 9.15 a.m. sharp, and all teams are requested to meet at the mine office not later than 9.15 a.m., in order to be in readiness. Underground clothes must be brought and worn by all competitors. The usual indemnity form must be signed by all proceeding underground, but the teams who are competing, with the knowledge and sanction of their respective man-

others, are covered against accidents by a special provision in the Workmen's Compensation Act. Each team must provide the equipment required by Clause 18 of the rules, and the particular attention of all competitors is drawn to Clause 13 of the Rules. Should inhalation apparatus be required in the Practical Test, it will be provided. By the kindness of the management, lunch will be provided for the competitors and officials.

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The report of the directors of the South Village Deep for the year ended 31st December, 1915, to be submitted at the meeting of shareholders to be held on March 31st, shows that the property consists of a minepacht of 131 morgen 205 square rods, on the farm Turfontein No. 125, Witwatersrand Gold Fields, and the township of Rosdenvill, held under freehold title. The investments now consist of 420 shares in the Village Deep, Limited, 600 shares in the Meyer and Charlton G.M. Co., Ltd., 500 shares in the Government G.M. Areas (Modderfontein) Consolidated, Limited, and £20,000 6 per cent. debentures in the Randfontein Estates G.M. Co., Ltd. The revenue for the year amounted to £2,781 0s. 10d., and the expenditure, including provision for doubtful rents, to £1,411 15s. 2d., thus giving a surplus of £1,339 5s. 8d.

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In connection with the original subscription of £100,000 by the Consolidated Mines Selection as working capital for the reorganised Daggafontein Gold Mining Company, the *Financial News* understands that the Central Mining and Investment Corporation, Henderson's Transvaal Estates and Messrs. Barnato Brothers have been granted participations. A more powerful financial combination it would be difficult to find, so that when the further £200,000 shall be required no shareholder need entertain the slightest doubt as to the ability of the group to provide it.

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In the House of Assembly this week, the Minister of Mines told Sir Abe Bailey that he had seen the statement made by General Hertzog to the effect that the mines would be worked out within 20 years, but had no report from the Government Mining Engineer to that effect. Evidence on the subject was given by the Government Mining Engineer before the Economic Commission in 1913, and would be referred to in that official's report on the Far East Rand, which would be laid on the table of the House this session. The Minister of Mines told Mr. Feetham that the Small Holdings Bill was in the hands of the Parliamentary draftsman. A report on the small holdings at Finaalspan and Randfontein had been prepared, and would be published with the Miners' Pithbliss Committee's report.

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In the course of a recent interview in Paris, the French economist, M. Paul Leroy Beaulieu, expressed the opinion that the war will not plunge the belligerent nations into bankruptcy, or anything like it. Undoubtedly the pauperizing effect of the Great Campaign has been exaggerated by failure to realise how much of the abnormal expenditure is distributed among the people of the respective countries at war; moreover, the richness of these countries and their powers of recuperation are vastly greater than is generally assumed. On the basis of precedent wars in periods of early industrial development, M. Beaulieu predicts remarkable manufacturing activity at the close of the war, about a year hence, and commercial rivalry among the nations, leading to protective tariffs, even in England, and yet higher tariffs in the United States.

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In the Senate last week, Senator Murais asked Mr. Mahan (Minister of Mines): (a) What diamond mines he personally visited during the past year, and in respect of which of them—giving the names—was the undertaking resumed? (b) Would he resumed at the beginning of the year, or how many, and which of them, had since

started work; (c) are the diamond mines in the Protectorate of South-West Africa—formerly German South-West Africa—being worked? The Minister of Mines replied: (a) I visited the Kimberley, Jagersfontein, Koffyfontein, Roberts Victor, Blaauwbosch and New Eldand diamond mines. (b) None of the mines could give a definite undertaking to start work, but the following have started partial work: Kimberley (two mines), Jagersfontein and Koffyfontein. (c) Yes, but they are not allowed to produce more than 10,000 carats collectively per month.

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Speaking at the annual meeting of the South African Gold Trust, Lord Harris said: "As regards our S.A. Gold Trust and South Africa. prospects, South Africa is in the enjoyment of an ample supply of native labour. On the other hand, it has, like the rest of the

world, got to face a heavy increase in the cost of many things that are necessary for mining, and consequently the profits are not what they would have been under ordinary circumstances. One of the companies in which you are considerably interested, the Sub Nigel, is giving very encouraging indications. Victoria Falls also is doing extremely well. You have got about 20,000 shares in the Robinson Deep new company, and I dealt at such length on the subject of the amalgamation of that company with Booyens in my Gold Fields speech that I will not trouble you with that again; but we cannot overlook that against these encouraging prospects there is the fact that we have considerable investments in the form of debentures and shares in mining ventures which are, as I have said, wasting assets. In Rhodesia, the Falcon Mines are doing extremely well, as you could judge from the recent meeting and Mr. Prinsep's speech, but there again we have got to take into consideration the fluctuations in the price of copper, and whether, and if so to what extent, profits may be affected by the excess profits tax. Shamva has come into the list of dividend payers since we last issued our list of assets, but with these two exceptions we cannot at present say very much about our Rhodesian investments, except that we always have the hope that they may make good." In reply to a question, the Chairman pointed out that the Simmer Deep was an enormous proposition, but of a very low grade. It had to face a big debt. He did not think that so far they had had all the advantage of the extra amount of labour which was available, because the new boys had to be trained, but from that point of view, for the first time since the repatriation of the Chinese, the mine had a chance. With sufficient labour its prospects of meeting the debenture service were certainly better.

\* \* \* \*

Some specimens of diamonds found at the Simmer Deep mine were exhibited by Mr. J. E. Thomas at the last meeting of the Geological Society. They had survived the pounding of stamps weighing 1,600 lbs. and escaped with little damage, apparently, from a subsequent process of tube-milling and grinding by heavy pieces of steel shafting and hard steel balls in the various stages of cleaning up. For the rest they were much the same in appearance and size as the numerous others that have from time to time been found in the Klerksdorp district and at Modderfontein and other mines of the Rand. The comparatively small amount of abrasion to which the faces of the specimens had been subjected was the subject of some discussion by Dr. Mellor, who observed, finally, that there was no evidence to lead one to the view that they might have been derived from dykes, which as a source of enrichment of one sort or another, seems to have a kind of fascination for many mining people along the Witwatersrand. Since the diamonds, together with the gold, have, according to Dr. Mellor, been brought down in river and placer gravels from the north-west, it would be interesting, as Dr. Wagner observed, to know the probable source of this great stream which could yield so various and valuable products. Mr. Thomas, who is President of the Chemical, Metallurgical and Mining Society, gave a brief description of the circumstances in which the exhibit had been found, and took occasion to

#### Diamonds in Banket.

invite the attendance of the members at the next meeting of the former body, when a discussion on Dr. Mellor's recent paper on the Witwatersrand System would be inaugurated.

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In our issue of the 11st inst. a paragraph appeared with regard to the Sheba mine, in which the tonnage stated as crushed for the month of January was incorrect. The figure given was 6,800 tons, whereas a printer's error made it 800 tons.

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The number of white men in the employ of the Rand mines was 21,920, and in other districts of the Transvaal 863, a total for the gold mines of 22,783 in January. Reef and alluvial diggers numbered 110, and on metallurgical and tailings works there were 28 employed, a total for the gold industry of 22,921. On diamond mines 1,113 were employed, on coal mines 1,263, on base mineral mines 582, and on lime and flint works 63; a grand total of 26,242 whites employed on mining concerns. Of coloured labourers 209,123 were employed on the Rand and 11,747 on mines in outside districts, a total for the Transvaal of 220,870. Reef and alluvial diggers employed 794, and on metallurgical and tailings works there were 197, a total for the gold industry of 221,861. Diamond mines employed 1,155, coal mines 21,859, base mineral mines 7,453, and lime and flint works 1,097, a total for the mining industry of 259,107.

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"We understand," says the London "Times," "that within the next day or two the Committee, which has been invited by the Colonial Secretary and the President of the Board of Trade to elaborate a British spelter (zinc) scheme, may be expected to hold its first meeting for the purpose. The Committee, which is representative of the different interests, is not even committed to the principles of a single scheme, for when the deputation was received at the Colonial Office a few days ago the Ministers were informed that the outlines of two schemes had been discussed. The first provided for the payment of a Government bonus if and when the price fell below £23 per ton, and the other for a Government guarantee of interest on new capital expenditure, and the Committee, so it was pointed out, was probably slightly inclined towards the bonus system. There seems reason for thinking that if a satisfactory bonus scheme were prepared the Government might not be unwilling to subscribe a substantial amount, say, £500,000. Then if the ore-producing companies in Australia were ready to subscribe another £500,000, it would seem not unreasonable to invite the great users of spelter in this country, the brass and corrugated iron manufacturers and other interested companies, to subscribe a further £500,000. With a capital of £1,500,000 large new smelting works could be built, presumably in the neighbourhood of coalfields, for about three tons of coal are required for every ton of ore smelted. No relief to the spelter situation could be given for some time since the building of works would take between a year and two years, according to circumstances, and the labour problem would call for special care. Possibly a garden city would form part of the plan. It, as might fairly be expected, Government contracts over a period of years were forthcoming, the scheme would start with a measure of support; but clearly the bonus system would have to be protected again; the dumping on the market of the German surplus production. What dangers were latent in the old dependence on Continental exports has been proved by the experience since the outbreak of war, for, the German exports having ceased this country was for a time faced not only with enormous prices, but with a positive famine of spelter. One great merit of the bonus system would be that no difficulty would occur in dealing with existing works; they would participate, like new works, in any bonus distributed, and might even look to recoup themselves for past losses, whereas under an interest guarantee system special allowance could hardly be made for past deficits."

#### Zinc Smelting in Great Britain.

## TOPICS OF THE WEEK.

### BRITISH TRADE AFTER THE WAR.

An interesting letter from the British Electrical and Allied Manufacturers' Association appears in the report of this issue. Through the courtesy of that body, we have received a copy of the report of a Sub-Committee of the A.E.A.M. Committee to the Board of Trade "on economical intelligence with respect to measures for securing the position after the war, of certain branches of British industry." The Sub-Committee, which was appointed in July last, directed its inquiries only to a few branches of industry. Nevertheless, its recommendations involve important features, which the President of the Board of Trade has deemed it desirable to publish "pending the institution of further inquiries . . . without, of course, taking responsibility for any of its conclusions." The information which the Sub-Committee has obtained is also of economic interest quite apart from the suggestions which are made for it. The branches of industry to which inquiries were confined were: Paper manufacture, the printing trade, the steel industry, the jewellers' and silver smiths' trades, the glass and other goods, glassware, china and ceramic articles, electrical apparatus, brush trade, and leatherware. It is interesting that German competition in these branches of trade is limited to certain special lines of goods and does not extend to the whole range of articles included in the class and that in a number of cases the exports of United Kingdom manufactures included under the same general heading are larger than, or nearly as large as the former imports. Dealing with the detailed representations as to the possible Government assistance might be given to certain branches of industry which have been coming to the Sub-Committee, it lays particular stress on the value of further research. It appears that in at least six out of the eight for industrial research has recently been established by a Committee of the Privy Council. A strong Advisory Council has been appointed and a number of applications for assistance are before that body, which has been asked to make grants. The new scheme is largely experimental, but it is considered "capable of much value, and a Committee before us gives the first place in its recommendations to the proposal that larger funds should be placed at the disposal of the new Committee of the Privy Council, and that the Board of Education, "for the promotion of scientific and industrial research and the improvement of the standards of the work of the country," should be asked to make grants. The need of this, "though it was a point on which the manufacturers and workmen have not always been agreed, is in the past sufficiently apparent to justify the institution of an investigation into industrial problems, and the carrying out of the plan." In addition, however, to the carrying out of industrial research, there is need for the protection of British industries by means of that unit. The Sub-Committee to the Board of Trade Committee, from whose report the above is quoted, "While devoting attention to the measures of assistance made to it on such questions as the effect of the war on trade marks and transport of goods, the Sub-Committee finds that these matters are of secondary importance in comparison with the primary importance of the war on the ability of otherwise of our products to compete with those of the world. Practically all the industries which have been considered by us are in a position to be protected by a system of protective tariffs." The Committee pointed out that the war has not only increased the demand for our products, but has also increased the competition in price which was a factor before the war will be accentuated. The Committee does not lose sight of the wisdom of the Government for Imperial preference, and the "need for a change preferential trading with those countries our Allies in the present war." In many cases, however, the proposals for protective tariffs made by the various bodies of the different branches of industry more particularly dealt with

in the report, the Committee expresses the view on the general question that "a larger proportion of the revenue should be raised by reasonable import duties." Of the five members of the Committee, Sir Albert Spicer, M.P., alone makes his signature of the report subject to a reservation. He feels that the consideration of a tariff should wait until after the war, and is of opinion that for the present the prejudice against enemy goods will afford sufficient protection. Some extracts from this extraordinarily valuable report will appear in our next issue.

## AMERICAN CAPITAL FOR SOUTH AFRICA.

So much has of late been heard of American capital coming to South Africa that we have been at some pains to ascertain just how much basis these various vague rumours possess. It has been possible to trace some of them back to a well-known consulting engineer, not lately attached to any of the big houses here, who is now on his way to New York. Before leaving, he was good enough to favour us with his views on the subject, which seem of some interest, even if they are not above criticism. By way of introduction, he points out that for some time past it has been possible to attract to this country a certain amount of capital from Great Britain and France for gold ventures outside the limits of the Witwatersrand area as well as for base metals and coal. As the great war has proceeded, however, and its operations have been extended over so vast a field, the flow of this capital has ceased, except in some instances where options have been reduced and money is forthcoming for the payment of these only. It is now an established fact that America has never in all its history been so well off in hard cash as she is to-day. Moreover, it is now claimed that there is an inclination to invest American money in South African propositions. The war has altered many conditions of life and business generally, and of finance in particular, and if capital in America must find an outlet somewhere it is asked why not in South Africa? The greatest confidence is expressed that if good sound propositions are offered, the necessary money to develop them will be forthcoming. The attractions of South Africa from a mining point of view can, of course, be vouched for by mining engineers in America, who have resided here and have been intimately connected with mining in this country for several years past. Our informant concludes thus:—"It will be my great aim to bring to the notice of the American capitalist the great possibilities of South Africa. From a mining standpoint, apart from the Witwatersrand area very little has been accomplished; not because the minerals are lacking, but for want of the necessary capital. With an extension of mining operations either in gold, base metals or non-metallic minerals, markets for agricultural and other products, for which the different parts of the country are admirably suited, will be opened up, and thus employment will be afforded to the numberless men who, after the war, will have to be provided for. I am convinced that the time has arrived when capital in America will be attracted to Africa, and in addition to what we have personal knowledge of in the Transvaal and other Provinces of the South African Union, there is also to be considered the mineral wealth of the country recently acquired, viz., German South-West Africa. Copper, tin and diamonds have already been worked there at a profit, and there is in so large and unexplored a country undoubtedly a field for further discovery. In German East Africa, I am aware, on the best authority, that both in minerals and as a farming country, it is greatly superior to German West, and up to the present, in proportion to its vast area, very little work has been done. Here then is surely an outlet for the great wealth which is being accumulated in America, and it will be my first and great object to prove that in South Africa we have a country where some of it can be wisely invested." However sceptical we may be regarding the results of this enterprising mission, we can only wish it every success. The country wants all the capital it can get, whatever be the source.

## THE REVISED WATER SUPPLY SCHEME.

A SPECIAL joint report of the committee on the Vaal River scheme was submitted at the meeting of the Rand Water Board yesterday. The necessity for a new scheme for an additional water supply from a catchment area is shown, and the report indicates the protracted investigations which led to the adoption of the Vaal River scheme. It will be remembered that legislative powers were obtained, and the whole of the preliminary arrangements in connection with the commencement of the scheme had been made in July, 1914. The outbreak of the war, however, made it quite impossible for the Board to raise a loan on reasonable terms and a subsequent regulation issued by the Imperial Treasury practically closed the doors of the London Money Market against every borrower excepting the State. The immediate accomplishment of the Board's purpose being thus defeated, the important question shortly afterwards arose, what measures, if any, could be adopted to prevent the difficulty likely to be experienced in keeping pace with consumers' demands during the war period, and until a loan could be raised and the Vaal River scheme completed. Investigations were carried on during the past six months with the object of obtaining further temporary supplies, as an insurance against a shortage, during the late winter and early summer months of each year. Out of these investigations arose a proposal to borrow from the Board's Redemption Fund sufficient money to construct a modified Vaal River scheme, which would provide such a supply of water as would be likely to secure the Board's consumers against a shortage for some years to come. On inquiring further into this proposal from the engineering, financial and legal points of view, it was found practicable and was accepted as a definite policy by the Standing Committees, and adopted by the Board in Committee last month, subject to certain reservations. This modified scheme provides for the erection at Lindeque, of the barrage designed in connection with the original Vaal River scheme. The barrage will be composed of 36 gates, each 25ft. high and 30ft. wide. It will impound altogether 13,633 million gallons, of which the Board will be at liberty to abstract annually up to 7,200 million gallons, or 20 million gallons a day. The report describes the means to be adopted to bring the water into service, and says that the estimated cost of the whole scheme is, approximately, £758,000. Of that amount, about £42,000 has already been expended on the collection of data, legal and Parliamentary expenses; the erection of weirs; and on other minor works and services classified under the head of preliminary expenses. The chief engineer states that the whole scheme can be completed and water from it brought into service in three years from the date on which the construction work is actually commenced. Assuming that the scheme will be commenced within the next few months, the Redemption Fund moneys will be sufficient to meet the expenditure on the work up to about September, 1918, without borrowing from an outside source. It will then be necessary to obtain a loan, which will not exceed £260,000, and may be considerably less, to meet the balance of the expenditure necessary to complete the scheme by about April of 1919. This temporary loan will be repaid by half-yearly instalments out of the moneys falling due to the Redemption Fund during the two and a half years to the 31st March, 1921, so that on or about the latter date the whole of the money required to carry out the scheme will be obtained from the Redemption Fund. This method of financing the Vaal River scheme seems the easiest and the cheapest, and in fact, the only reasonable means at present available to the Board of obtaining the funds required. A supply of six million gallons from the Vaal River will, in all probability, be in service by about the middle of 1919 if the works are commenced next May or June, and the new loan of £758,000, as well as the current loan, will be repaid in 16 years thereafter, during which period mining operations on the Rand will not, probably, suffer any very appreciable diminution.



## SOUTH AFRICAN SULPHATE OF AMMONIA INDUSTRY.

### An Extensive Plant in Course of Completion in Natal—Prospects of the Fertiliser Output—Large Sums Already Expended in Construction.

The great progress that has been made by the construction works of the Natal Ammonium Syndicate, near Vryheid, and the solid and extensive character of the plant already erected have attracted special attention to the operations of the company. There can be no doubt that every effort is being made to carry out the programme laid down by the board when steps were first taken to inaugurate a sulphate of ammonia industry upon a large scale, not so much with the view of local consumption, at any rate in the earlier stages of the concern, but rather with the object of supplying the excellent markets that already exist in the Far East. From the United Kingdom alone the export of this fertiliser to Japan and Java exceeds 100,000 tons per annum, at a price of over £16 per ton f.o.b. Hull. It is not unlikely that a considerable demand for the product may arise in this country, but that is an event for which the company is prepared to wait. Analysis of bulk samples of the coal which were made at the works of the Power Gas Corporation, Ltd., Stockton-on-Tees, show that the coal obtained on the Vryheid properties is exceptionally high in nitrogen, and particularly suitable for the manufacture of sulphate of ammonia. In fact, Mr. A. Gordon Salaman, A.R.S.M., F.I.C., of London, reported that the amount of nitrogen was abnormally high. The coal, of which there is an immense quantity available, is well adapted to cheap mining also. Messrs. Frank Simon, of Tweefontein Colliery, and Harry Rhodes, of Rotherham, whose name is familiar to all who have much acquaintance with coal mining in England, have estimated the total working cost at approximately 1s. 9d. per ton delivered to the producer bunkers.

#### OTHER PRODUCTS.

In addition to sulphate of ammonia, the chief source of the company's income, there will be obtained, as by-products, gas and tar. The former will, of course, find no sale for some time; but it can scarcely be doubted that the possibilities of gas as a cheap source of power will lead to its use in some way or other later on. A number of projects

for utilising this power are under consideration, but the policy of the company is to get the sulphate plant working before steps are taken in connection with other industries. The yield of tar, which may also be looked upon as a future commodity of sale, has more ready uses, especially in road-making. Its employment by the Municipality in Johannesburg, where about 300,000 tons of it are used annually, is an object lesson to other Municipalities in the country. Much of this material is imported. Sulphuric acid will be manufactured specially by the company for its own requirements.

#### THE PLANT.

The works, when finally completed in accordance with the original plans, will comprise a Mond By product recovery plant, consisting of two units, each unit being capable of dealing with 205 tons of coal per 24 hours, or a total of 150,000 tons per annum. The output of sulphate of ammonia from the works, on this basis, will be a little over 9,000 tons per annum, which, as remarked by Mr. Salaman will be merely a drop in the ocean as compared with the world's requirements. It will, however, be sufficient to secure a good revenue to the company until such time as it may be deemed advisable to increase the output. At present, we understand, the full plant as originally contemplated will not be erected, the capacity aimed at in the beginning being something like 5,000 tons of sulphate of ammonium per annum. The capital of the concern is £325,000 in 225,000 participating preference and 100,000 ordinary shares of £1 each; all the shares are issued and fully paid. After payment of a non-cumulative preferential dividend of 7 per cent. per annum on the participating preference shares, the surplus profits are to be divided equally between both classes of shares. Some £350,000 are said to have been expended already in the purchase of property and purchase and erection of the plant. The Mond interest is well represented upon the board, for whom Messrs. Harper Bros. and Co., and Mr. H. Rhodes are acting as consulting engineers. Mr. Howard Pim and Mr. Robert Niven form the local advisory committee.

### The Mining Manual and Year Book.

The 1916 volume of "The Mining Manual and Mining Year Book" is the thirtieth consecutive yearly issue. All those interested in mining enterprise who have reason to study the financial position of the industrial companies or to obtain light on their potentialities, will find the volume indispensable. The work covers every section of the mining market, and many mines whose shares are not dealt in at present on the London Stock Exchange are included. In a world-wide industry such as is mining, the progress of evolution is continuous and varied, and therefore to embody every new phase requires unflinching effort and much time. Both have been spent without stint to maintain the reputation of the "Mining Manual and Mining Year Book," which for completeness and accuracy has stood unrivalled from its inception. Every individual notice is carefully revised annually and, wherever possible, officially verified. The alphabetical arrangement adopted last year as regards the body of the work has met with universal approbation as proving the handiest form for quick reference. At the same time the index has not been abandoned, since it is found very helpful—especially to those not over-familiar with Stock Exchange nomenclature—for cross-reference. Thus "Chartered" will be found in the index with a cross-reference to British South Africa Company, the "Gold Fields" with a cross-reference to Consolidated Gold Fields of South Africa. The object of the "Mining Manual and Mining Year Book" has always been to keep in touch with a company from its birth until its demise. To carry out this policy, but at the same time avoid the work becoming too unwieldy, the supplementary index (which, to obviate the confusion found by experience occasionally to arise, has been separated this year from the index proper and transferred to the end of the book) fulfils a valuable function. The supplementary index contains the names of those companies which have either ceased to be of public interest or are in too dormant a state to justify their inclusion in the body of the work. By turning to that one of the previous volumes set opposite the respective names full particulars can be ascertained. Thus while particulars are supplied in the volume itself of 1,569 companies, the supplementary index with its references to earlier volumes, covers no less than 2,657 additional

companies. No important innovations have been made in the body of the work, whose numerous informative features by now almost speak for themselves. Instead of meagre details as to capital, date of registration, etc., the references will be found as heretofore complete in every particular likely to be of use and are moreover entirely based on authoritative information. An analysis of at least the last balance sheet and in many cases of the last two is a prominent feature of every notice, while dividends from the start are given, also details of ore reserves, borehole results, description and capacity of treatment plant, and any other facts likely to be of service to those who consult the work. As regards the finance companies, details of their holdings are reproduced in all cases where they have been officially vouchsafed. The practice of placing full tabular statements of the crushing results of all the various mining fields together at the beginning of the book has, again been followed, as this system has proved the most convenient for ready reference and comparisons. Alphabetical lists of mining directors, secretaries, engineers, and mine managers, with their addresses and the names of the companies with which they are connected, are as usual included. These are supplemented by an up-to-date dictionary of mining terms, which is yearly revised in order to include the fresh puzzles set mining operators by the extension of enterprise to new fields where unfamiliar currency, weights, etc., are employed. For instance, the explanations of the terms used in the reports of Russian mining companies will be particularly helpful, the more so as they are not to be found in ordinary mining glossaries. The work may be obtained locally from Messrs. W. E. Hinton and Co.

#### Rezende Mines.

The results at the Rezende Mines for the month of February were as follows: Central Section, estimated profit, £572; Old West Section, estimated profit, £670; total estimated profit, £1,242.

## FUTURE PRODUCERS OF THE FAR EAST RAND.—II. EAST RAND MINING ESTATES.

### A Large Area of Great Possibilities—Position of Grootvlei—Development on Neighbouring Properties.

THE improved outlook for the whole Far East Rand very largely affects the fortunes of the East Rand Mining Estates. No development work was carried out by the company during last year. The encouraging developments in the Springs and Geduld mines, which adjoin the company's Grootvlei property, and on the neighbouring Modderfontein properties, have, however, fully confirmed the views held by the directors that in the Grootvlei and Palmietkuil properties the company possesses "an extensive gold-bearing area of great value." The various boreholes put down on these two farms have definitely proved the reef to exist over the whole of the Grootvlei and the greater portion of Palmietkuil, whilst the development work since carried out on adjoining properties has more than justified the expectations formed as to the value of the reef in this neighbourhood. Under existing financial conditions it has been quite impossible to raise the necessary working capital to continue the development and equipment of these mining areas, but the directors feel convinced, in view of these satisfactory developments, that they will have little difficulty in obtaining the necessary funds required for the purpose when normal conditions are restored. The results recently obtained on neighbouring mines consistently emphasise the potential value of the East Rand Mining Estates' ground, more particularly the results achieved by the Geduld Proprietary Mines and the Springs Mines—both of which immediately adjoin the Grootvlei property. The Daggafontein, which adjoins the East Rand Mining Estates' property on the south, has proved the reef in its shaft at a depth of 3,570ft., giving a value of 8 dwts. over 10ins. The area owned by the East Rand Mining Estates, directly or indirectly—that is to say, through its share interests in the Grootvlei proprietary mines, and its interest in Palmietkuil—is equal to 2,268 mining claims. The company's former consulting engineer, Dr. Hatch, estimated the ore contents per claim at about 17,000 tons.

#### HISTORY OF THE COMPANY.

The company was formed in March, 1901, to acquire from Messrs. Lewis and Marks interests in freehold farms in the Heidelberg and Pictoria districts of the Transvaal—viz., Grootvlei No. 176 (adjoining Geduld), Palmietkuil 61, Modderfontein 16, Rietvallei 283, and Zonderfont 283, in the extension of the East Rand, and Vlakfontein 65, in the Heidelberg district; also options over mineral rights on farms in Heidelberg district (since abandoned); total net freehold area, 21,116 acres. The consideration was £250,000 in fully-paid shares. Boreholes have been sunk on Palmiet-

kuil (which adjoins Grootvlei) and the main reef struck at 3,085 feet depth. The company owns a five-eighths interest in this farm, the owners of which will be entitled to take out a nypacht equal to 1,283 claims in addition to a further 150 claims as discoverer's rights. The farm Grootvlei has been proved by the Grootvlei Prospecting Syndicate, Ltd., which has formed a parent company, called the Grootvlei Proprietary Mines, Ltd., to develop the property; the main reef on this farm has been proved by means of four boreholes to underlie the whole area at depths ranging from 2,000 to 3,000ft. The company holds 233,020 Grootvlei Proprietary shares. The farm Vlakfontein has been sub-divided into six portions, and each portion has been let for farming. It is proposed to extend this policy to the other properties. On the advent of normal conditions, working capital is to be raised to develop and equip Palmietkuil and Grootvlei. The capital is £500,000, in shares of £1 each; 450,000 shares are issued and fully paid, 250,000 being vendors, 150,000 subscribed at par for working capital in 1901 and 50,000 offered to shareholders at £1 10s. each in May, 1909, the issue being guaranteed by the African and European Investment Co., Ltd., at a commission of 1s. per share and an option to June 1, 1910, over the unissued shares (50,000) of £1 15s. each (not exercised).

#### GROOTVLEI.

The Grootvlei Company was registered on April 23, 1901, in the Transvaal, to acquire from the East Rand Mining Estates, Ltd. (and other companies also concerned in the property), the whole of the mining rights (other than coal) of the farm Grootvlei No. 176, 7,241 acres in extent, situate in the Heidelberg district, East Rand, Transvaal, adjoining the farm Geduld. The purchase consideration was £265,250 in fully-paid shares, 230,250 of which were payable to the East Rand Mining Estates, Ltd., and others, and 30,000 (with an option on a further 100,000 shares at par) to the Grootvlei Prospecting Syndicate, Ltd.; the Syndicate had prospected the property by boreholes, the Van Ryn reef being struck at 3,340ft. and 4,010ft. depth on western boundary, and at 2,500ft. on eastern boundary. The company is entitled as owners to about 986 mining claims. Two shafts, 5,600 feet apart, have been sunk to depths of 378 feet and 55 feet respectively, but owing to rush of water operations have been temporarily suspended. Shaft sinking is to be resumed when further working capital has been obtained. The reef is expected to be cut at 3,000ft. The capital is £600,000, in shares of £1 each; 361,650 shares are issued and fully paid, including vendors. The capital was increased from £100,000 in October, 1910.

### Wire an Important Product.

Wire is one of the most important products of the metal industry. Without it, electricity, as it is so generally used to-day, would be quite impossible. The world is encircled by wires. Like the silken strands of a cable they are woven over the face of civilised countries, stretched across the trackless wilderness, and buried in the sands of every ocean. The making of wire is one of the oldest of the metal arts. Thousands of years ago wires of gold and silver were drawn. The ruined cities of the early Egyptians contain wires. Even the prehistoric civilisation knew how to make it. Wires of gold and silver have been recovered from the graves of the ancients in Asia, Africa, and in South America. The first wires were rolled from thin strips of metal. It was a long time before an inventive silver smith discovered that the metals could be drawn into wires of any thickness by pulling them through dies. By gradually decreasing the size of the die the metal can be drawn out as fine as a silk thread. Indeed, the metal tungsten is drawn out finer than a human hair for the filaments in Mazda electric lamps. Wire is absolutely indispensable to the electrical industry. Without wire there would be no generators, no motors, no converters, no transformers, no measuring instruments, no telegraph or telephone instruments, no transmission of speech or power, and no distribution. Even so-called wireless apparatus is based on the proper placing of antennae composed of wire.

### From the Electric Field.

Electric heaters are used to keep frost from show windows. Vacuum cleaners are now used in large factory buildings, as well as the home. A large electric range has been installed at Wellesley College, Wellesley, Mass. A wide variety of small car phones, for the deaf have been recently placed on the market. It is estimated that there are 2,000,000 horse-power of undeveloped water power in Vermont. A new system of "flood" lighting is now used to illuminate large and important buildings at night. A toy electric range, which can actually be used for cooking without danger of fire, is the latest for little women. A small X-ray machine is now used in dentistry for locating root canals, erupted and impacted teeth, etc. A number of electric heaters have been developed for private garages to keep automobiles from freezing up. The General Electric Company has perfected new and more powerful gas-electric locomotives for the "Dan Patch" line. Electricity has been a big factor in cheapening water supplies for towns and cities, and its employment is rapidly growing.

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## COST OF OIL SHALE TREATMENT.

### Expenditure on Plant in Scotland—Mr. Cunningham Craig's Estimate for Natal—Some Australian Figures.

THE actual cost of mining and treating oil shale in new countries does not appear to be capable of reliable calculation, except by experts of very wide experience. Only by constant improvements in their distilling apparatus have the Scottish shale companies been able to reduce their costs sufficiently to enable them to compete against the imported oils and solid paraffin obtained from petroleum. The cost of a modern crude oil plant in Scotland, exclusive of erection and delivery, with a daily capacity of, say, 750 tons of shale, is estimated at from £90 to £133 per ton of shale. This includes three benches of retorts (with breakers, engines, pumps, condensers, boilers, sheds and connections), naphtha recovery plant, ammonium sulphate plant and brickwork. A refinery for 1,000,000 gallons of oil per annum costs £11,000 in Scotland, or 5s. per ton of shale retorted, and a Scotch candle house complete costs, say, £6,000, or 2s. 6d. per ton of shale treated. An ammonium sulphate plant in Scotland costs about £4 per ton of shale treated.

#### SOUTH AFRICAN ESTIMATES.

It is of interest to note that Mr. Cunningham Craig has estimated that on a basis of 20 gallons of crude oil per ton and fifty pounds of ammonium sulphate—the cost of mining being, say, 4s. per ton—the ammonium sulphate should be sufficient to pay the costs of mining with something well over, while the crude oil when refined to produce a maximum of petrol and lubricating oil, should leave quite a satisfactory profit over and above the total cost, including everything. These estimates, it may be added, were upon the assumption that a Del Monte plant would be installed, erected complete, and capable of treating a minimum of 300 tons of shale per day, for the sum of £40,000. A great deal was talked of the Del Monte process a year or so ago, when some interesting demonstrations of its capabilities and economics were given in England, but little has been heard of its performances upon a reasonable working scale, and it is difficult to say whether it would accomplish the purpose

required of it as satisfactorily as Mr. Cunningham Craig was led to believe.

#### VALUATION.

An approximation to the value of oil shale of any grade may be made by calculating the value of crude oil and ammonium sulphate per lb. on the recovery, according to the market quotations. Against this is to be put the cost of mining, retorting and recovering ammonium sulphate. The following figures are obtained from Scotland:—

Mining, per ton of shale	3s. 6d. to 6s.—say 5s. 0d.
Retorting, per ton of shale	1s. 6d. to 2s.—say 1s. 9d.
Manufacture of ammonium sulphate	2s. 0d.
	Total 8s. 9d.

It must be explained that this estimate is based on miners wages of about 6s. 3d. per day in Scotland, and helpers at 5s. 9d. The output per shift per man varies from three to four tons on seams 5 feet to 7 feet thick. In New South Wales, according to a report by Mr. Lionel C. Ball, B.E., Government Geologist in Queensland, the rate for hewing shale in seams from 3 to 4 feet thick is 3s. 6d. per ton. The cost of manufacturing crude oil from kerosene shale at Murrumbidgee, in New South Wales, is stated to be 4d. per gallon, or 11s. 8d. per ton of shale (averaging 35 gallons per ton). The cost of manufacturing ammonium sulphate in Scotland is £2 5s. per ton of sulphate, allowing for a consumption of £1 5s. worth of sulphuric acid, and on the assumption that the cost in Australia would be twice as great it is calculated that considerable profit would still remain in the quality of shale mined. This may easily be understood from Mr. Ball's remark that "10-gallons shale would by many be considered rich enough for treatment. The Australian shales are of exceptionally high grade, but, as will be seen from Mr. Cunningham Craig's statements, a satisfactory profit can be made from something very much less than 40-gallons shale in this country."

### Dredging in Manicaland.

In an article on the dredging operations in Portuguese Manicaland appearing in the *Beira Post* under the heading of "Old Beira," the writer says:—"We got the Winifred dredge at work, but, on account of boulders, instead of doing 60,000 yards a month—the presumed capacity of the 'dredge'—could only do about 600. We got our averages all right, but could not deal with the quantity. We had a twelve-mile water race to a head stock which filled an 18-inch pipe. Over 4,500 feet of pipe line, graduated down to 12 inch, brought the water of which a portion drove the pump and the rest was forced through the 2 or 3 inch nozzles of the Giant monitors. These monitors cut down the gravel to the bed rock and drove it to the sumph of the suction dredge. Everything up to a foot in diameter was sucked up and carried over the gold saving sluice box. The boulders, however, beat us everywhere. A trial was made with elevators and the monitors, but very little more stuff could be treated. Probably some £20,000 was expended on the property from first to last, and finally as it was impossible to get money for further exploitation the ground was abandoned and dredging ceased in the Revue until a year or two ago. Here again Mr. de La Marliere was faced with the boulder question and the Alpha dredge would have been a failure if it had not been discovered that boulders could be blasted, when in the actual grip of the bucket chain, with a small surface charge of dynamite without damage to the dredge. How the working of this Alpha dredge has substantiated the value of the Revue for dredging and carried out to the grain all our claims everyone knows. If confidence in the Manica fields had not departed with Captain d'Andrade we might

have got over the smashing of the wild cat dredging schemes but Johannesburg would not be enlightened on the matter of title and turned down anything from this quarter. We are again unfortunate with the occasion of the success of the Alpha. If the ordinary mining interest was not stunned by the war the returns from this dredge would have brought capital and enterprise into Manica and given the district the chance that will prove it an important gold field." The present dredging operations have been a success right from the start, the recovery varying from two to three grains per cubic metre, with expenses at the equivalent of about one grain.

## PERSONAL.

His many friends on the Rand will be glad to hear that Captain Ralph Stokes has been awarded the Military Cross.

\* \* \* \*

Mr. W. McC. Cameron—after nearly 15 years' residence on the Rand, first as manager of the Porges and South Randfontein mines of the Robinson group, and later of the May Consolidated, and since then as consulting engineer to the Goerz group—left this week for London, where he will reside indefinitely, and intends to do something, together with other Rand Americans, in connection with the war. On Saturday evening last Mr. Cameron was entertained by the consulting engineers of the Rand to a farewell banquet.

## A YEAR OF MADAGASCAR MINING.

### Gold Output up to Previous Returns—Radio Active Minerals—Prospecting Activity.

[FROM A MADAGASCAR CORRESPONDENT.]

OFFICIAL figures as to Madagascar mining in 1915 are not available, and their publication will certainly be delayed considerably owing to shortages in the staff of the various departments, many units having been called out on military duties. On the whole, mining has recovered from the setback occasioned by the hostilities in 1914 and the uncertainty then prevailing as to the disposal of the output as far as the base metals were concerned. Of precious metals, gold alone received attention, and the output for 1915 might be estimated to have reached the previous year's figures, viz., about 3,000 kilos. With rare exceptions the primitive system of exploitation is still practised in alluvial workings, viz., the purchasing of the gold from natives at a price varying from 160 francs to 2 francs per gramme and realising it at from 3 to 330 a gramme. Claimholders contend that the system is the best under prevailing conditions, as it does not entail any outlay in plant and machinery and hardly any supervision. Where sluice boxes are or have been employed the results have not always reached expectations and the natives found out at once a substantial falling off in their average monthly earnings, which has detracted from the popularity of sluice boxes. What the wastage is, in spite of skilful panning, we can easily surmise as the gold is often rusty and dull and often float. Of the various sluices employed, those of the Galland pattern are the most in use, and the results obtained would justify their further use if proper attention to local conditions were given due consideration. Reef mining only applies to the Andavakoera and adjoining grounds in the extreme north-west, the falling-off in the output has been remarkable of late years, the rich patches and stringers met in the upper levels failing to show well further down. While the alluvial grounds of Madagascar still offer opportunities to those possessing the necessary qualifications to secure fair returns for their outlays, the fact should not be lost sight of that in addition to gold some of the placers might yield rare metals such as platinum and palladium, and in more substantial quantities monazite sands and uranium ores. The importance of the uranium bearing sands has of late drawn the attention of the Colonial authorities who have issued some very interesting instructions to prospectors, several of whom are holding uranium claims, and some concentrates have been shipped to France and others are on the way. The attention of prospectors has also been drawn to the fact that other minerals have been reported as occurring in the alluvials of a still greater

radio activity than uranium, and it is suggested that samples should be submitted to analysis. A Commission of four mining engineers has been deputed by the French Government to carry on a thorough investigation of these recent discoveries, and the writer is of opinion that Madagascar will shortly be the most important source of supply of radio active minerals. Monazite has been traced in large quantities and will in due course receive attention, but it would be now the right moment for South African capital to step in and to secure some interest either by prospecting or by acquiring claims held already. Precious and semi-precious stones, which prior to the war had formed the object of considerable export, especially to Germany, have been neglected of late owing to the conditions of this market, but might receive attention later on again. Base metals have been entirely neglected.

#### NON-METALLIC MINERALS.

After a lull, graphite has been receiving again some attention, and the large areas held under claims might still increase the already important output. In 1914 some 8,000 tons of graphite were exported, and if the market will warrant it the output could be brought to a much higher figure; in fact, it is to be expected that the island could alone supply the world's requirements in graphite. Graphite has been traced in payable quantities from the extreme south to the extreme north, and specially in the east it occurs under most favourable conditions and does not require heavy outlays for plants. It is found mostly in disintegrated rocks, either in veins in soft laterite or disseminated in kaolin, generally in flakes, occasionally reaching considerable sizes. Large occurrences of the finest mica, both Muscovite and Phlogopite, are met, especially in the centre and south of the island, but no exploitation is recorded, mostly owing to the difficulties attending the mining and the subsequent treatment for the market, of this mineral. The economical quarrying and splitting of this mineral could only be undertaken by men thoroughly acquainted with this particular branch of mining, but there is no doubt that profitable extraction could be obtained should the right people secure the ground. Prospecting in general cannot be attended with any chance of success, unless the prospectors make themselves acquainted firstly with local conditions and try to gain a certain knowledge of the native language and do away with interpreters, often the source and cause of much trouble.

#### Book Review.

*Tacheometer Surveying*, by M. E. Yorke Eliot, Assoc. M. Inst. C.E., F.R. Met. Soc. London: E. & F. N. Spon, Ltd., 57 Haymarket. 148 pp.

It would be difficult to find a more comprehensive and useful five shillings' worth of information of its kind than that contained in "Tacheometer Surveying," by M. E. Yorke Eliot. It has been prepared mainly for the benefit of the surveyor student who has to rely largely upon his own resources in the matter of handling and using instruments in the field, and in booking, calculating and plotting his observations. Although primarily adapted to this purpose, it will prove of considerable use even to those who have the opportunity of working under experienced teachers, for the explanations are lucid, practical and comprehensive, without being unnecessarily long. As is usual in works of this kind, complete field notes of a survey are given, properly booked and plotted in detail upon an accompanying plan. There is a useful chapter on the field work of a contour survey in connection with these notes, the various opera-

tions and the reasons for them being explained step by step. The process and methods of plotting are also dealt with at length. Special reference must be made to a chapter on the calculation of lines and areas from co-ordinates, in which some care is taken to explain the use of the planimeter. The adjustments of the tacheometer are clearly set out, and the book concludes with a brief description of the slide rule and its manipulation, which should be as welcome as it is unusual in many text books on surveying. Altogether the little volume is one that we can gladly recommend.

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## THE POSITION OF THE E.R.P.M.

### Decreased Ore Reserves and Unfavourable Development—Satisfactory Mine Development Cash Reserve.

THE E.R.P.M. quarterly report to December 31 is none too reassuring. The best feature is the fact that the actual expenditure on development amounted to £50,854 7s. 8d., as against £68,031 5s. provided in the working costs (at 2s. 1 9d. per ton milled), leaving a balance of £17,176 17s. 4d., which added to the balance at 30th September, 1915, of £327,712 10s. 1d., gives a total of £344,889 7s. 5d. From this amount a sum of £16,610 15s. 4d. has been appropriated for the purchase of £18,760 debentures bought in excess of the amount which has to be redeemed annually in terms of the Debenture Trust Deed, leaving a balance of £328,278 12s. 1d. standing to the credit of Mine Development Suspense account at 31st December, 1915. During the quarter £11,920 of the company's debentures were acquired, bringing the total purchases for the year up to £108,760. Development operations continue to disclose ore of which a large proportion is unpayable. The ore reserves as at 31st December last now being estimated are expected to show a decrease of approximately 650,000 tons as indicated in the

quarterly report issued in July. The annual reports will be issued to shareholders in the course of a few weeks. Working costs were £519,112 1s. 9d., or 18s. 6d. per ton milled; working profit was £137,107 4s. 10d., or 4s. 10d. per ton milled; revenue, £656,249 6s. 7d., or £1 3s. 4d. per ton milled. The approximate cash and financial position, after providing for all liabilities, but exclusive of the debenture issue of £1,151,240, shows £521,632 8s. 9d. Approximate cash position brought down, £328,800 5s. 9d.; cash assets (stores, sundry debtors, payments in advance, etc.), £192,832 3s.; a total of £521,632 8s. 9d. The footage done was:—Incline shaft sinking, 329ft.; vertical shaft sinking, 7ft. Development: Number of feet driven, risen and sunk (excluding shafts), 11,286ft.; footage sampled 8,398ft.; average reef channel width, 27ins.; average assay value over reef channel width, 9.6 dwts.; number of cubic feet excavated (stations, ore bins, etc.) in addition to above footage, 143,151 cubic feet. Mining: Ore mined, including ore mined from development faces, 591,853 tons; ore taken from surface dumps, 18,050 tons.

## DREDGING IN MOZAMBIQUE.

THE general manager for the Andrada Mines, Ltd., L. C. de la Malhière, has communicated to the *Mining and Scientific Press* the results of the first year's work of the dredge "Alpha," which is working in the Mozambique territory (Portuguese East Africa), near the Rhodesian border. After a trial, the dredge was set to work on February 10, 1914; from then to December 31, 1914, it worked out a surface of 19½ hectares, or approximately 48 acres, digging a depth of 14 ft. 8 inches. During this period it treated 1,149,798 cubic yards, yielding gold worth 11,076,239 francs, equivalent to 18½ cents per cubic yard. The expenses, including all the general charges, in Mozambique, at Paris, and London were 545,090 francs, excluding amortization. The cost therefore was equivalent to 94 cents per cubic yard. The dredge worked 5,407 hours, being stopped for repairs during 1,912 hours, and for lack of power during 483 hours, equivalent to 2,355 hours of lost time. The total is distributed as follows:—For repairs and improvements, 39 per cent.; for lack of power, 27 per cent.; for boulders, 20 per cent.; for moving the dredge and stepping ahead, 14 per cent. The average working-time per day, counting the loss from lack of power, was 16 hours 40 minutes. The yardage treated per month averaged 100,000. This was unsatisfactory and was due to shortage of power, caused by the dry season, which lasts nearly three months. The company has erected an auxiliary Diesel oil-engine plant to remedy this defect. The average expenses per month have been: White men, 13,400 francs; natives, 1,600 francs; material, 12,500 francs; power, 5,500 francs; realizing gold, 1,000 francs; sundries, 1,400 francs; general expense, 14,000 francs; total, \$10,000, or 49,400 francs. As this one dredge had to bear all the general expenses, the cost is very high, for it includes all the expenditure in prospecting, to prepare ground for additional dredges. 1 Dredge-master, \$200 to \$250 per month; 3 Winch-men (each), \$175 to \$200; 3 Oilers (each), \$150; 1 Fitter, \$200; 1 Blacksmith, \$175; 1 Shore-man, \$125; 10 natives, 25c. to 75c. per day and food. An average of three Americans has been employed, their board being paid by the company. The two features of this dredging operation are:—(1) The blasting of the boulders in the buckets, 5,625 blastings in 11 months 20 days. (2) The swinging of the boat in a pond about 1,000 ft. wide, sometimes 1,200 ft. This wide pond helps to render the monthly outputs less irregular, especially in patchy ground. Wear and tear of the principal parts of the dredge was dis-

tributed as follows:—Notwithstanding about 8,000 blastings, the buckets have not been changed until August, 1915, after 19 months' work. The lips could serve two months more, 50 per cent. of the hoods were cracked or pierced, the bottoms and eyes were in very good shape and will serve for another 18 months, with new lips and hoods. Pins have lasted 18 months; bushings have lasted 9 months; screen-plates have lasted 18 months; conveyor-belts have lasted 10 months; wire cables have lasted 8 months. The cast-iron rollers, for the conveyor-belt, were all broken in a month's time, on account of boulders. They are now made of cast-steel and resist much better. During the first six months in 1915, the output has been 673,256 francs for a treatment of 781,253 cu. yd., that is, an average of \$22,141 per month for 130,209 cu. yd. excavated.

It would appear, says the *Middellburg paper*, that the spirited agitation which has for some time past been carried on in the Press and in Parliament has had a considerable amount of desired effect in regard to the supply of railway trucks for the coal industry. For some weeks past now there has been quite a plethora of trucks at Witbank available for the conveyance of coal to the Rand and to the coast, and the collieries have been enabled to work at full pressure, and to maintain such an output as has not been the case for a very long time past. "Not to put too fine a point upon it," Witbank coal owners have for weeks and weeks past been too busy to grouse. It only shows what the Railway Administration can do with regard to an adequate supply of trucks if only it likes to take the trouble to do so. Sir William Hoy is certainly doing at present ever so much better than Mr. W. W. Hoy did. And the dear old coal industry of Witbank is booming beyond its wildest dreams.

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## APPLICATION OF ELECTRIC POWER TO RAND MINING WORK.

[By J. NORMAN BULKLEY.]

As electrical power is used to a greater extent on the Rand than in any other mining centre, it is thought that a short description of the methods used and results obtained may be of interest. In comparing Rand practice with that on other fields several general factors should be borne in mind: First, the mines are all working on large tonnages of low-grade ore (average \$6.50). The annual crushing rate is about 27,000,000 tons. Second, the mines are all grouped under the financial and engineering control of mining houses, so that the results of a group, rather than an individual mine are open for study, and practice follows more uniform lines. Third, coal of fair quality (about 12,000 B.t.u.) can be obtained for \$2 to \$3 per ton. Good supplies of condensing water are, however, scarce, and have to be carefully stored.

### POWER SUPPLY.

Power is supplied by the Victoria Falls and Transvaal Power Co., Ltd., and its subsidiary, the Rand Mines Power Supply Co. Both companies, which are practically one from an engineering point of view, operate the following stations, all feeding into the same system.

Station.	Capacity Installed Turbo Alternators.	Capacity Installed Steam Turbine Driven Centrifugal Compressors.
Brakpan	Two 12,500-kw. sets Two 3,000 kw. sets	
Simmer Pan	Six 3,000 kw. sets	
Rosherville	Two 11,000 kw. sets Five 9,600-kw. sets	Six 3,500-kw. machines. Three 7,000 kw. machines.
Vereeniging	Two 9,600-kw. sets Two 12,000-kw. sets	
	162,200-kw. sets.	
Total steam-turbine capacity installed	204,200-kw.	

There are also at the Robinson Central air station six motor-driven centrifugal compressors, each of 3,500 kw., equal to 22,000 cu. ft. per minute at 120 lb. capacity at 3,000 r.p.m. Power is supplied from these stations as 50-cycle, three-phase current generally at 40,000 volts, though the western end of the line is at present worked at 20,000 volts, and the Vereeniging tie line at 80,000 volts. The supply to the consumer is generally at 2,100 and 525 volts. The combined output of these stations is about 2,000,000 kw.-hr. daily, exclusive of air, with a peak load also exclusive of air of about 92,000 kw. In addition to the supply furnished by the above companies, three groups furnish their own power, viz.:—

	Station, Kilowatts.
Randfontein Group	26,000
East Rand Proprietary Co.	20,550
Kleinfontein Group	6,000

### PRICE OF POWER.

Standard contracts of the Victoria Falls and Transvaal Power Co. are for a period of not less than 12 years at 0.525d. per kilowatt-hour as long as the monthly load factor is above 0.70, the load factor being based on the hour of maximum consumption. Provision is made for a periodical revision depending on cost of production and a division of profit with the consumers after certain deductions are made. As the other stations do not supply consumers outside their own group, no figures for them can be given.

### APPLICATION OF ELECTRIC POWER.

**Reduction Works.**—(a) *Stamp Mills.*—In the modern mills of 2,000 to 1,900 lb. falling weight, the stamps are arranged five stamps on a camshaft, two camshafts being driven from a countershaft driven from one 50-h.p. squirrel-

cage motor running at from 500 to 600 r.p.m. This arrangement is generally the most convenient as it permits of overhauling both line and countershaft pulleys, so that belts can be easily removed, and the placing of motors on foundations at ground level, doing away with all motor platforms. It also makes a convenient arrangement when it is necessary to hang up stamps. When squirrel-cage motors are used, the absence of all brush gear permits the starting gear to be placed in front of the mortar box so that the mill man has a good view of the battery in starting up. With squirrel-cage motors there is no difficulty in starting up with stamps all down after a failure of power supply. Starting up can also be considerably eased by slacking off the belt tighteners. In some cases of conversion of old mills from steam to electric drive it was found impossible, owing to structural details, to adopt the plan outlined above; therefore a comparison of power required for such cases may be of interest. Mill A is of 75 1,250-lb. stamps all driven from one motor through line shaft; line shaft was in good alignment. Mill B is of 120 1,250-lb. stamps weighted up to about 1,500 lb. falling weight and has two line shafts each with a motor driving 60 stamps; conditions of line shafts not so good as in Mill A. Mill C is of 100 1,900-lb. stamps of which usually only 50 are running; drive is 40-stamp arrangement described above. Results are given in following table:—

Mill.	Monthly Tonnage.	Kw.-Hr. per Ton Crushed.	Number of Motors.
A	14,910	10.42	1
B	28,260	8.13	2
C	33,451	4.84	10

(b) *Tube Mills.*—These are usually driven by belts direct from a 500 to 600 r.p.m. motor to tube-mill countershaft. Direct coupling to pinion shaft though flexible couplings with motor speed of 250 r.p.m. has been used in a few cases but without much success as the jar from the mill tends to break down the motor windings. On account of the high starting torque required, motors must be of the slip-ring type, and if the motor is properly proportioned to the mill with heavy starting resistances, there is no necessity for the employment of clutches or belt-shifting devices. The usual motor is 125 h.p. operating at 600 r.p.m. for a 5 ft. 6 in. by 22-ft. tube mill; or 100 h.p. for a 5 ft. 9 in. by 16-ft. mill.

(c) *Other Motors.*—The motors required for rock breakers, conveying plant and cyanide works are generally standard squirrel-cage motors belted directly to individual machines. In the cyanide works a number of centrifugal pumps with direct-coupled motors were used, but owing to the necessity of adjusting speeds to suit heads, these have been discarded in favour of belt drive. The number of motors required for a modern reduction works of about 40,000 tons monthly capacity will be roughly 125, and by intelligent selection the number of sizes required can be reduced to six or seven, so that spares will be a minimum. The load factor of reduction works with 20.7 tons per stamp duty can easily be kept about 86 per cent. and the average distribution for the newer works (40,000 tons per month capacity) will be as follows:—

	Kw.-Hr. per Ton Milled.
Stamp mill	4.29
Tube mill	6.00
Tailings wheels	0.87
Cyanide works	1.55
Breaking and sorting	0.68
Mechanical haulage	0.20
Lighting	0.23
Mill water supply pumps	0.65
Total for reduction works	14.45

(To be continued.)

## THE CONGLOMERATES OF THE WITWATERSRAND.

### Characteristic Features of Special Types—Sedimentation and Distribution of Gold—Placer and Infiltration Hypotheses.

IN view of the fact that a discussion of Dr. Mellor's paper on "The Conglomerates of the Witwatersrand," which has been read recently before the Institution of Mining and Metallurgy in London, and before the Chemical, Metallurgical and Mining Society in Johannesburg, will take place at the next meeting of the latter Society on Saturday evening next, the following summary of the main points dealt with in the paper are of particular interest:—

(1) Gold occurs much more widely in the Witwatersrand system than is frequently assumed to be the case, being found in practically all the well-marked conglomerates, which are distributed throughout the system.

(2) Whereas certain of the conglomerates, like those of the Elsburg group, conform more or less to the generally-held idea that the pebble-beds were originally laid down as ordinary marine shore-deposits, there are other types, including the most conspicuous gold-bearing beds such as the Main Reef Leader and South Reef, which are of a very different character, and which are similar to certain persistent conglomerates in the Lower Witwatersrand system—e.g., the Government Reef. The characteristic features of these special types are their astonishing persistence as individual beds over very large areas, and in some cases the way in which they abruptly succeed a considerable series of fine-grained sediments.

(3) These features appear to be due to these particular pebble-beds having been laid down under conditions similar to those obtaining in an extensive deltaic area either upon its outer fringe or within the delta itself, and as a result of episodes of exceptional activity in sedimentation such as are known to occur in existing deltas.

(4) The character of the whole succession of strata of the Lower Witwatersrand system, whose deposition preceded that of the Main Reef group, is consistent with the explanation here suggested, there being evidence that the shore-line of the land surface from which the sediments were derived was at first at some considerable distance from the present locality of the Rand, but occupied successively nearer positions until, at the time of the deposition of the Elsburg beds, it was in close proximity to it.

(5) The two most important gold-bearing conglomerate beds of the Rand—the Main Reef Leader and the South Reef—are characterized by the comparative uniformity of the material of which they are composed, and by the continuity of the whole deposit. These characters are such as would result from the rapid redistribution of large quantities of gravely material already graded and accumulated in the lower portions of a great continental river and in the upper portions of its delta. The pre-eminence of the Main Reef group from a mining point of view is not exclusively due to an outstanding content of gold as compared, say, with the Bird or Kimberley Reefs, but to a large extent is a result of the degree of concentration of the gold within such beds as the Main Reef Leader. Had this bed, after its deposition, been subjected to the action of waves and coastal currents the result would have been a deposit more like the Main Reef or like portions of the Kimberley and Bird series, in which the distribution of the gold is very similar to that found in many recent marine placers. The concentration of the gold in such beds as the Main Reef Leader and South Reef is closely connected with their sedimentary features and is such as might be expected to result from the conditions of deposition, and there is a similar correspondence in other groups and in their individual pebble bands, between the distribution of gold and sedimentary features.

#### FAR EAST RAND CONDITIONS.

(6) The conditions found in the far Eastern Rand, including the presence of only one principal reef and the possibility of following it in many different directions, afford much better opportunities for the investigation of the problem of the origin of the gold than the more complicated conditions of the Central Rand. In the former area the close connection between the occurrence of gold and of conglomerate, even when these occur in isolated patches entirely of conglomerate, even when these are so universal and striking as to render it exceedingly difficult to conceive how such associations could be due to other than a common cause. The continuity shown by the Main Reef Leader in the far Eastern Rand and the occurrence of considerable quantities of gold in that particular bed over an area of hundreds of square miles, which, in this wide extent of horizontal or but slightly inclined beds, is more than ever difficult to explain on the infiltration theory, receives a natural and adequate explanation when considered in connection with the stratigraphical features of the area and the probable mode of origin of the conglomerate bed.

(7) Difficulties in the way of accepting a placer origin for the gold have arisen from confining attention largely to a few particular reefs which are exceptional in character compared with a large number of associated conglomerates, and making comparisons between these

and stream-placers or ordinary shore-deposits with which they have as little in common in sedimentary features as in regard to their gold contents. When a comparison is made between the more ordinary members of the Rand Conglomerates and such deposits as those of Nome, a very great similarity is apparent, and the exceptional characters of such auriferous beds as the Main Reef Leader are not surprising now that fuller data concerning its stratigraphical relationships and the conditions leading up to its deposition are available.

(8) The solution and re-precipitation of the gold, which is generally accepted as having taken place by those who accept for it a detrital origin, has been shown to have similarly happened in the Black Hills conglomerate, one of the only known auriferous conglomerates of an age comparable to that of the Rand deposits, and in this case, as in the secondary quartz-veins of the New Goch Mine, and also in the example given from Bourbonne-les-Bains, a very notable feature is the re-deposition of the gold and other minerals in the immediate neighbourhood from which they had been derived.

#### THE SPECULATIVE INFILTRATION HYPOTHESIS.

It may further be noted that the features presented by the Rand conglomerates with regard to the distribution of the gold are no more exceptional than are the sedimentary features of the conglomerates themselves when compared with other known occurrences, and, further, that whereas the evidence in favour of the gold being an original constituent of the conglomerates is direct, and becomes more and more complete with the fuller investigation of the sedimentary characters of the formation, the arguments for an extraneous origin are highly speculative, and are frequently of such a nature that, though apparently satisfactory when applied to one portion of the field, they appear entirely inadequate to explain the conditions met with elsewhere.

The theoretical and highly speculative nature of much of the evidence adduced in favour of the infiltration hypothesis will be noticeable to anyone examining the fullest and most recent exposition of it by Howwood, and the fact that it is thought necessary to bring in so many subsidiary lines of argument indicates the absence of such direct evidence as would be considered in itself of a sufficiently convincing character.

The question of the nature of the association of gold with the Rand conglomerates is, of course, of the very greatest importance, both from the point of view of the student of ore-deposits and of those interested in economic and practical mining matters. Whether the conglomerates are to be regarded as "fossil placers" or as "lokes" has much to do with the future possibilities of the Rand, and of conglomerate occurrences in other localities in South Africa and in other parts of the world.

#### IMPORTANCE OF EAST RAND DATA.

To my mind, after an extensive study of the whole formation, the evidence in favour of the former view is convincing and is increasing continually with the extension of our opportunities for the collection of information. The even balance in the weight of evidence in favour of opposing theories which obtained a few years ago has been materially disturbed by the data now available from the far East Rand, and from a more extended study of the whole Witwatersrand system.

If the Rand conglomerates are really placer deposits, then the question as to whether mineral beds decrease in value in depth has no application to them, since they belong to an entirely different class of occurrences. Variation in the character of the conglomerates will be related to sedimentary causes, and thought they may be subject to the vicissitudes of sedimentary deposits, they are not likely to exhibit the pronounced vagaries common in mineral veins, and, moreover, as our knowledge of the district increases, we shall be able to predict with a less degree of uncertainty future possibilities.

The much debated question of the possible impoverishment of the Rand ores in depth is one beset with many difficulties. It is almost impossible to give due weight to all the considerations which enter into that problem, or even to obtain the data regarding the earlier operations in this goldfield, which are necessary for a solution. That the question has remained so long in doubt shows, however, that the evidence in either direction is not of a very decisive character. Whatever the final result may be, it will probably be fully recognised at some later time that the diminution in value was not at all a function of depth, but one of direction, and depended not upon the flow of subterranean mineralizing solutions, but of surface streams.

In connection with this matter Rickard refers with ridicule\* to the expectation of Rand engineers that profitable blanket would extend to 18,000 ft. on the dip. It is only fair to assume that this attitude was adopted without knowledge of the amount of information we possess with regard to such a chain of mines as the Van

\* "The Persistence of Ore in Depth." Trans. xxiv., p. 12.

Ryn, Kleinfontein, Van Ryn Deep, Brakpan and Springs. Here we have already the essentials of the expectations referred to more than realized.

From a geological point of view, the Nigel has practically the same claim as Modderfontein or Kleinfontein to be regarded as the outcrop of the Springs Reef, and with very slight changes in the geological history of the district, the Nigel might very easily have been the *only* outcrop. This is an aspect of the matter which suggests a number of very interesting speculations and is worth consideration by those interested in the question under discussion.

In a field like the Rand where there exist enormous quantities of auriferous material, whose payability or unpayability depends upon slight reductions in the cost of mining or of treatment, the question of the degree to which natural causes contribute to the cheapness of working is a very interesting one. In this connection, the degree to which the gold distributed through certain beds has been concentrated either laterally or vertically, is noteworthy. In the Central Rand the comparative degree of separation or approximation of the different reefs is often a very important factor, as for example, where two thin leaders are near enough together to be mined in the same stop, or where a thin but comparatively rich reef, as the Main Reef Leader may be in places, which cannot itself be profitably mined, lies sufficiently close to such thicker but poorer bodies as the Main Reef or the Bastard usually are, to enable the combination to be advantageously dealt with.

In the far Eastern Rand, where a single reef has usually alone to be considered, the question of the horizontal distribution of the gold becomes of greater importance, and it is a fortunate feature, throughout the greater portion of that area with which we are acquainted, that the conglomerate of the principal reef shows a marked tendency to lateral concentration into the well-defined

patches described above. The corresponding concentration of the gold distributed over any particular area, which has so far been found to be usual, will considerably simplify the work of the miner in that area.

Another fortunate circumstance, probably only fully appreciated by those directly concerned in actual mining, is the presence of the slate footwall. Exploratory work directed to finding reefs, temporarily or permanently lost by faulting or other causes, has probably formed a much bigger item in the cost of mining in the Central Rand than is generally recognised and might form an interesting, if not exhilarating, subject of research in statistics.

In the far East Rand, with a flat dip and a single reef, absent altogether in places, such exploratory work might have been a still more formidable item were it not for the unusually good "marker" afforded by the slate footwall in that area—another advantage of the close relationship everywhere existing between the distribution of the gold and sedimentary features.

Of an abundance of points in connection with the Rand conglomerates, which are of the greatest interest, both from a purely scientific and from a practical mining point of view, no mention has been made in the present paper, which has, nevertheless, extended considerably beyond the length originally intended. In connection with some of these points, a considerable amount of information has already been collected; others remain for investigation. As stated at the outset, no attempt has been made to deal with the large body of literature which has already accumulated around the subject of the Rand conglomerates. The necessity for limiting consideration to the line of investigation which has fallen more especially within the scope of recent survey work also prevents adequate reference to the vast amount of work which has been done by previous writers in connection with aspects of the conglomerates not specially discussed in the present paper.

The subject of pig iron manufacture was specially referred to at the last meeting of the Central Munitions Committee, which met recently at Johannesburg. One of the members for South Africa, expressed the belief that it was possible to procure an electric furnace, the main-

tenance cost of which would be comparatively light if cheap electric power was procurable. The first cost of the furnace, it was stated, would not be great, and it was felt that the vast amount of water now running to waste in some of the South African rivers could be successfully applied to the production of cheap electric power. In this connection the local representatives will probably remember the Howick Falls, which are fortunately situated as regards iron deposits. Some of the other rivers of South Africa are almost equally well situated. In all cases the danger of starting furnaces in out-of-the-way places, or in districts that possess insufficient deposits, has to be avoided, otherwise the Government may find itself in the same unenviable position in respect to the pig iron industry as it does towards the Cape collieries, the coal from which has to be bought at considerably more than value to save the collieries from closing down. There must be none of the "more haste, less speed" method in the starting of new industries, but the Government will surely not make that mistake with the example of its attempt to establish creameries before it. The *Natal Advertiser* says that one of the first steps is to learn the requirements of the country, and this, as has already been stated, is recognised by the Central Committee. The Government Departments, the Mines, the Municipalities, the Provincial Councils and the Divisional Councils of the Cape Colony have all been asked to provide the details. When these reach the Central Committee the local committees will be notified and asked to ascertain what can be supplied from their districts. The details will be classed and tabulated, so that for the time being the Central Committee is not busy. Another great difficulty to be overcome before the efforts of the committee can be considered successful is that of the chemical requirements of the country. Practically every industry in being in South Africa depends largely upon chemicals of some sort or other. The mines require acids, the soap industry needs soda, and the sugar production cannot dispense with lime, etc. It is not improbable that out of this need will spring other industries, and it is mentioned that argol is used at the mines, and that is a bye-product of the wine industry. It is made from the deposits which form in the wine casks, and at present, as a bye-product, is sent to Italy for treatment. The country is said to be rich in the articles which are the

basis of most chemical manufactures. Sulphuric acid is manufactured in various parts of South Africa, but the sulphur used is imported. Sodas are imported for use in soaps, yet the basis of these sodas is common salt, of which there are deposits in the Free State and the Cape, and common salt can also be made from sea water. It must be emphasised that South Africa has a most unique opportunity presented to it, and that a natural protection is afforded by the war. Industries are not, however, started in a day, and it is to be hoped will not be too hastily, but at the same time it must be pointed out that whatever industry is started it will have several years' run before foreign manufacturers can hope to again compete. The war is bound to retard the foreign importations for a considerable period after the war has terminated, and in the meantime the local industries could get a firm footing from which they need not be easily dislodged, even without the protection of the Customs.

\* \* \* \*

The white labour report for February says that Rand building trades are not showing any signs of advancement, although it is known that quite a good list of substantial buildings are certain to be proceeded with if conditions become at all favourable. Engineering workshops continue to be very busy. There is no surplus of skilled mechanics to draw on at present, but work is proceeding satisfactorily. The work in hand is considerably in excess of what falls to our local shops in normal times. Work in the gold mines is plentiful, and a decidedly increased activity on the coal mines has taken place in the last two months. The output of furniture is increasing and the work more substantial if less ornamental than Austrian and other overseas importations. Tin and sheet metal workers are busy, as also are boot and shoe factories. In the Cape Province many trades which had been in a dull condition for some months—including printing, fish packing, harness and saddlery—are again becoming active. The demand for labour also shows a marked sign of improvement. The shortage and high price of materials in building, engineering and printing trades are hampering the development of local industries. There is a marked shortage of skilled boiler-makers, fitters and turners and copper-smiths.

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## Correspondence and Discussion.

### Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal—Views, Suggestions and Experiences of Readers.

#### Geological Truth Tablets.

To the Editor, *South African Mining Journal*.

Sir,—There is only one reliable map of the Far East Rand, viz., "Nature's Map," which places the extension of the Nigel or Van Ryn series of reefs on the farm Holgatfontein, trending north under the homestead of Vlakfontein No. 21, etc. Mr. Bleloch, in his latest map bearing on his claims north of the Nigel G.M. Co., ignores nature, and has taken it on to his own ground. May be it is intended as a joke, but it is no joke as far as Holgatfontein is concerned. All geologists will have it that the Kimberley series is strongly in evidence in boreholes, etc., on the Far East. I say distinctly that it is not there at all, as understood by them, and what they mistake for it are the top beds of the Black Reef series—such as the Battery, Monarch and Kelly beds, with Black Reef underlying on shale. If the Kimberley series of the Central Rand were really there, as they say, then in order to reach the Van Ryn or Nigel Reef the Bird, Main, Blue Sky and Van Ryn series must be drilled through to reach it—only a matter of a couple of miles drilling compared to the orthodox three thousand something feet. Whenever I hear anyone suggest that the Van Ryn and Nigel are separate reefs, it reminds me of Hertzog and his two-stream policy—a wicked thing! The thinning-out theory of our Witwatersrand beds as they go east and south under the coal measures, is also a red rag, for, if this be so, how is it, may I ask, that they all emerge as large as life on Sparwater and along the Heidelberg Town Lands, etc.? There is only one point with which I agree in Mr. W. T. Hallimond's report, published with Mr. Bleloch's map, viz., that the rich "Van Ryn series is a separate series of reefs to Main Reef series" and underlies it, as anyone can see if he steps up on to Rietfontein's, "late" Barnato's Consolidated Mines, Ltd., as marked on all maps, on the dip of the New Rietfontein G.M. Co., or old Du Preez. There its reefs are exposed in such a way as never was at the Van Ryn itself, or the Nigel either in the early days, and that is why no doubt they have not been recognised by later-day geologists, etc. The Van Ryn series is going to be a surprise packet to geologists and mining men alike one of these days, as it is bound to add another row of headgears to the Rand, and considerably augment its output.—Yours, etc.,

SCOTT ALEXANDER,

"Rand Stratigraphist."

Johannesburg, March 15.

#### British Trade after the War.

##### REPORT OF BOARD OF TRADE ADVISORY SUB-COMMITTEE.

To the Editor, *South African Mining Journal*.

Sir,—I have pleasure in enclosing herewith a marked copy of a Report of a Sub-Committee of the Advisory Committee to the Board of Trade on Commercial Intelligence dealing with measures for securing the retention and expansion of British trade after the war. The memorandum is based upon evidence given before the Sub-Committee by representatives of various trade associations and individual manufacturing firms. My Association, among others, gave evidence before the Committee, and also prepared a detailed memorandum, pointing out some of the unfair handicaps under which the British Engineering Manufacturing Industries have suffered in the past.

You will note from the marked paragraphs in the Report that the recommendations made by this Association have

been freely used from which it may be inferred that they represent the general feeling of the manufacturing industries.

For your information I would add that this Association now numbers among its members practically the whole of the electrical manufacturers of the country and the majority of the engineering industries which are allied with them. The subscribed capital of the firms represented amounts to well over £20,000,000, and the number of hands employed is about 100,000, so that the Association may be taken as representing over one-fifth of the general engineering manufacturing industries in Great Britain, exclusive of shipbuilding, marine engineering and locomotives made by Railway Companies.

This Association bears no similarity to the great American Trusts or to the German Syndicates and Cartels, as all the members retain their individual freedom of action, but act co-operatively for common objects, such as the discussion of questions affecting the industry generally and voicing the feelings of the industries in negotiations with the Government, Municipal and Public Authorities, and with the transport industries and kindred institutions. The Association also acts as a co-operative body for the promotion of business in Colonial and foreign markets and in the distribution of confidential and general information, which is of interest to the various sections of the allied industries.

In the hope that the foregoing information may be of interest to you.—I am, etc.,

R. N. DUNLOP.

The British Electrical and Allied Manufacturers' Assn.,  
King's House, Kingsway, London, W.C.,

February 16, 1916.

(The report in question is dealt with in our leading columns.—Ed.)

#### Diamonds in New South Wales.

A new journal made its appearance at Sydney, New South Wales, about the middle of January, under the title of "The Austral-Briton"—founded to advocate the international and Imperial interests of Australasia in the Pacific. Among the leading features of the early issues has been a series of articles by Mr. Daniel Grove, an Australian who was at one time associated with diamond interests in this country, on "The Occurrence and Distribution of Diamonds in New South Wales." In the first of these articles the writer deals with the early history of diamond discovery in South Africa, following on with a personal narrative concerning his connection with past South African mining negotiations, more particularly in relation to the Wessellon mine. The writer then proceeds to discuss in detail the subject of the occurrence and distribution of diamonds in New South Wales, expressing his conviction that there are "equally good fields" in that country, given the necessary skill, capital and an assured market for the product.

# WRIGHT'S ROPES.

## ECONOMIC GEOLOGY AND MINERAL INDUSTRY OF SOUTH-WEST AFRICA.—II.

By DR. P. A. WAGNER.

The ore of the main bodies, as mined in depth, is a massive coarsely crystalline aggregate, composed in variable proportions of argentiferous galena and chalcocite, accompanied by zincblende, pyrite, enargite, stibiozincite, and on the lowest level of the mine by chalcopryrite. Masses of fairly pure galena and chalcocite also occur. Of the aforementioned minerals the galena, chalcopryrite, enargite, pyrite, zincblende, and stibiozincite appear to be original constituents of the ore-bodies. The copper-glance, on the other hand, is clearly of secondary origin. It is found replacing the primary sulphides, and appears to have been deposited from descending solutions which derived their copper content from the decomposition of originally overlying portions of the ore deposit, since removed by denudation. In the upper levels of the mine the oxidation of the previously mentioned sulphides has given rise to the formation of all manner of secondary minerals, including malachite, azurite, cuprite, chrysocolla, diopside, olivenite, brochantite, linarite, cerussite, anglesite, limonite, smithsonite, calamine, hydrozincite, auriferous, mottamite and erinite. Beautiful specimens of all these minerals are obtainable, and many of them occur in large perfectly formed crystals, so that Tsumeb is a veritable paradise for the specimen hunter. Indeed, it is doubtful whether it is rivalled in this respect by any other ore-deposit.

Particular interest attaches to the occurrence, in fairly considerable quantities, of mottamite, a rare copper-lead vanadate, which forms botryoidal crusts and masses of dark greenish yellow colour. The mineral is separately bagged and exported. Native copper is said to occur on the lowest level of the mine, a little to the north of the western ore-body. The western ore-body has been found throughout to be richer in copper and poorer in lead than the eastern, the respective average copper contents of the two ore-bodies working out at about as follows:—

Western ore-body . . . . . 12 to 15 per cent.

Eastern ore-body . . . . . 6 to 14 per cent.

Maucher (63) gives the following analyses of representative specimens of rich ore from the western and eastern ore-bodies:—

	Western Ore-body.	Eastern Ore-body.
Cu . . . . .	15 to 25 per cent.	10 per cent.
Pb . . . . .	20 to 30 per cent.	50 per cent.
Zn . . . . .	Not determined.	Not determined.
Sb . . . . .	0.5 per cent.	0.5 to 2 per cent.
As . . . . .	1 to 2 per cent.	1 to 2 per cent.
Ag . . . . .	0.02 to 0.05 per cent.	0.02 per cent.
Au . . . . .	Traces	Traces.

The massive sulphide ore contains no gangue, but the microscope shows that even the most compact specimens invariably enclose fragments and particles of dolomite, and larger inclusions of this rock in various stages of replacement are met with in both ore-bodies. It is quite evident therefore that metasomatic processes have been largely responsible for the formation of the deposit as we now find it. What part was played in this connection by the aplite intrusion is still a matter of uncertainty. Krusch could find no trace of contact metamorphism in the dolomite bordering on the aplite, and does not appear to consider that the latter had anything to do with the formation of the deposit. Rimann, on the other hand, who ascertained by careful microscopic measurements that the dolomite at its contact with the aplite is much coarser in grain than away from the contact, is of opinion that the Tsumeb ore-body in its original form was a contact metamorphic deposit, and looks upon the aplite as the ore-bringer. Further investigation is clearly needed.

Mining and Ore Treatment at Tsumeb.—To a depth of about 90 feet the Tsumeb Mine was worked open-cast. Below this depth a system of overhead cross-stopping with concomitant waste-filling has been resorted to. The mine is served by a rectangular vertical shaft, equipped with a steel head-frame and a powerful geared steam hoist. A good deal of water has been struck in the lower levels of the mine, and two large electric pumps are in continuous operation.

Prior to the outbreak of the war the method of treatment consisted in classifying the ore hoisted to the surface by hand-picking into: (a) a high-grade copper product, which was bagged and shipped to America, it having been found that it pays to export for treatment all ore containing over 10 per cent. of copper; and (b) low-grade—mainly galena—and low-grade carbonate copper-ore, which were trammed to the local smelter. The latter is equipped with two rectangular water-jacketed blast furnaces, measuring about 10 feet by 3 feet at the tuyeres. The lead and low-grade carbonate copper-ore were fluxed with hematite and locally quarried limestone, and smelted with Westphalian coke for the production of a copper-lead matte and pig-lead. During the year 1913-14 only matte was produced. It averaged from 45 to 50 per cent. of copper, from 25 to 30 per cent. of lead, and from 15 to 18 oz. of silver per ton, and was exported to Germany for further treatment.

As the classification of the ore by hand was at best an unsatisfactory process, a large modern dressing plant was erected during 1914. The plant is equipped with rolls, jigs, concentrating tables and buddles. It was about to be put into commission when the war broke out. It is estimated that the ore at present in sight in the Tsumeb Mine will admit of the production of about 100,000 tons of ore being maintained for about five and a half years.

From Geological Survey Memoir No. 7.

Gross Otavi, Asis, Asis East, Guchab, and Bobos.—Less important deposits of copper-lead and copper ore occur at the above-mentioned localities in Otavi Mountains.

At Gross Otavi a bed of "cavernous" dolomite dipping at a steep angle to the south is, according to Kuntz, spangled with copper-ore in large and small pockets of irregular shape up to one cubic metre in volume. The pockets are connected by reticulating veinlets of ore. The ore is chiefly chalcocite, accompanied by bornite and chalcopryrite. Large quantities of galena are also present. The deposits at Asis East and Guchab are stated by Kuntz to be of the same nature as that at Gross Otavi, but to contain more compact bodies of ore. The occurrence at Asis East, also apparently of this type, was very patchy, and operations on it were suspended some time before the outbreak of the war. The copper and lead ores were, as at Tsumeb, accompanied by mottamite. Of the Bobos Mine deposits, the writer has only been able to gather that the ore, which is chalcocite, occurs in so-called "sand-sacks," which are described as cavities in the dolomite filled with soft friable sandstone (?). Since the aplite intrusion at Tsumeb was also, in its decomposed state, mistaken for sandstone, it is possible that these "sand-sacks" represent highly altered intrusions of aplite.

Output of the Mines of the Grootfontein District.—The shipments from Tsumeb and the lesser mines in the Grootfontein District since 1907, when systematic mining began, have been as under:—

Fiscal Year.	Copper and Lead Ores.	Copper Matte.	Metallic Lead.
1907-08 . . . . .	16,800	1,000	700
1908-09 . . . . .	27,700	3,150	3,000
1909-10 . . . . .	33,500	2,940	2,732
1910-11 . . . . .	31,600	2,220	2,040
1911-12 . . . . .	29,600	991	913
1912-13 . . . . .	44,550	655	400
1913-14 . . . . .	50,070	1,179	—

### (2) MAGMATIC DEPOSITS.

The Khan Mine, owned by the Khan-Kupfergrube-Gesellschaft, is, next to Tsumeb, the most important occurrence in South-West Africa. It is situated about seven miles south-south-east of Arandis—with which it is linked up by a narrow-gauge railway—in the valley of one of the minor tributaries of the Khan River. The deposit consists of an inclined vein of coarse-grained copper-bearing pegmatite, in gneiss. The vein strikes approximately north and south and dips to the west. Near the surface the dip is about 70 degrees, but at depth it becomes less, and in the lower levels of the mine it is only 45 degrees. The vein is mineralized over a length of about 1,100 feet and has been opened up to a depth of 690 feet on the incline. It varies in width from 8 inches to 7 feet, the average being about 3 feet, and in the northern portion of the mine carries an average of about 7½ per cent. of copper. In the southern part of the occurrence the copper content is much lower. The copper minerals named in the order of their abundance are bornite, copper-glance, chalcopryrite, and malachite. Apart from these minerals, the pegmatite consists of red and white feldspar, quartz, green pyroxene, and titanite, the titanite being present in fairly considerable quantities. The pyroxene occurs in lath-shaped crystals, which are frequently grouped in radial aggregates. In some portions of the ore-body this mineral is so abundant that the pegmatite practically becomes a pyroxene rock. Epidote, greenish mica, and chlorite are also generally present. The bornite, which, as previously indicated, is by far the most important copper mineral present, appears to be an original constituent of the pegmatite, and was, according to Stutzer, the last mineral in the rock to crystallize. It is generally accompanied by chalcocite. Whether the latter is primary or secondary has not as yet been established. Chalcopryrite is not, on the whole, very common. It appears, like the bornite, to have crystallized direct from the pegmatite magma. Malachite is confined to the superficial portions of the deposit. Zincblende is present in some parts of the ore-body. A considerable tonnage of ore has been blocked out, and an up-to-date crushing and concentrating plant erected in 1913 and 1914 was in operation for some months prior to the outbreak of the war. It has a capacity of 50 tons per diem. A concentrate, containing from 60 to 70 per cent. of copper, was being made and shipped to Europe in large drums.

(To be continued.)

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## THE FEBRUARY OUTPUT IN DETAIL.

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THE February output of 753,594 ozs. is 33,873 ozs. less than that for January, accounted for entirely by the short month. It is, however, better than that of last February, which had one day less, by 77,365 ozs. The stamp position shows an increase of 15 operating on the Witwatersrand, but 45 fewer than in January in the outside districts, leaving a net decrease of 30. The native labour return shows practically the same figure as that returned in January. Of the total of 219,864, 209,426 were employed on the gold mines. The salient figures are as follows:—

Total output	753,594 ozs.
Value	£3,201,063
Decrease	33,873 ozs.
Value	£143,885
Witwatersrand	727,346 ozs.
Value	£3,089,570
Decrease	32,506 ozs.
Value	£138,076
Outside districts	26,248 ozs.
Value	£111,493
Decrease	1,367 ozs.
Value	£5,809
Stamps	9,917
Decrease	30

### THE WITWATERSRAND.

	Output. £	Inc. £	Dec. £
Brakpan Mines	90,553	1,499	—
City and Suburban	47,405	—	3,916
City Deep	121,889	—	1,588
Consolidated Langlaagte	66,243	—	1,304
Consolidated Main Reef	41,466	—	1,228
Durban Roodepoort	14,119	—	162
Durban Roodepoort Deep	36,382	—	1,134
East Rand Proprietary	203,912	—	11,303
Ferreira Deep	96,360	—	4,761
Geduld Proprietary	41,640	—	19,353
Ginsberg	17,008	—	795
Glencairn Main Reef	13,028	—	46
Government Areas	66,451	—	26
Knight Central	28,740	—	2,260
Luipaardsvlei Estate	22,632	—	1,100
Main Reef West	28,855	—	174
May Consolidated	10,555	—	829
Modderfontein B.	96,844	—	5,305
Modderfontein Deep Levels	63,244	—	438
New Heriot	23,091	—	1,401
New Modderfontein	108,351	908	—
New Primrose	16,018	—	476
New Unified	13,691	—	179
Princess Estate	28,507	—	1,053
Rose Deep	81,217	—	81
Van Ryn Deep	82,826	1,533	—
Witwatersrand	51,074	—	135
Wolhuter	13,620	—	1,117
Aurora West	17,717	110	—
Jupiter	25,762	858	—
Knights Deep	83,931	—	1,291
Meyer and Charlton	34,113	—	986
New Goch	29,696	—	1,263
New Kleinfontein	64,200	—	7,506
Nourse Mines	63,933	—	1,485

	Output. £	Inc. £	Dec. £
Robinson	70,045	—	6,112
Robinson Deep	70,287	—	9,099
Roodepoort United	36,594	—	671
Simmer and Jack	71,918	—	2,935
Simmer Deep	59,052	5,157	—
Van Ryn Estate	45,888	—	2,082
Village Deep	75,023	—	2,362
West Rand Consolidated	38,017	—	867
Witwatersrand Deep	50,378	—	3,203
Bantjes Consolidated	23,834	—	722
Geldenhuis Deep	73,732	—	4,690
Langlaagte Estate	56,818	—	1,077
Randfontein Central	225,419	—	16,604
Village Main Reef	35,638	4,082	—
Vogelstruis Estate	13,364	1,921	—
Crown Mines	257,412	—	23,325
West Rand Central	1,720	—	242
Miscellaneous producers	6,325	—	1,485
Totals	3,089,570	16,128	154,201

### OUTSIDE DISTRICTS.

Sub Nigel	15,132	—	1,703
Barrett	4,257	191	—
Quest	2,782	—	159
Nigel	13,134	—	884
Sheba	12,204	5,267	—
Transvaal G.M. Estates	30,721	—	1,465
Glynn's Lydenburg	6,057	—	1,220
Fairview (T.C.L.)	3,768	1,088	—
Miscellaneous producers	26,135	—	6,624

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## RAND EARTH TREMORS COMMITTEE'S REPORT.—III.

### Exhaustive Review of the Subject—Historical and Descriptive—Valuable Recommendations.

24. *Rand Shocks not due to Natural Causes.*—It is, however, not possible, for reasons given later, to attribute the shocks experienced upon the Witwatersrand to any natural causes. Such tremors and shocks are felt in all districts where extensive mining is carried on, and for one case like that at Conrie where they were undoubtedly due to natural causes, there are hundreds of cases where they can be traced directly to mining operations.

#### ORIGIN OF SHOCKS.

25. *Theories as to Causes.*—Whilst the majority of the witnesses who appeared before the Committee agreed in attributing the shocks to the excavations produced by mining operations, certain other theories were advanced to account for them, either as first cause or as a contributory cause.

26. *Natural Causes.*—Among these theories the most usual one was that the shocks were due to the same natural causes as at Koffiyfontein, Rooiberg, and elsewhere. This theory has already been dealt with.

27. *Pumping of Water.*—Other witnesses alluded to the effect of pumping operations on the mines, as bringing about a contraction of the strata and causing a diminution of hydrostatic support. One witness, for example, attributed the shocks, which he erroneously considered as being confined to the Central Witwatersrand, to an earth movement along a fault running north-east and south-west across the centre of Johannesburg, such movement being initiated or accelerated by the water removed from the fault by pumping operations on the mines.

28. *Seasonal Influences.*—Other witnesses touched on the diurnal and seasonal changes of temperature and humidity. It was pointed out that shocks were more numerous in winter than in summer, and four times more frequent during the night than the day. One gentleman advanced a theory that the drainage system laid down in recent years in Johannesburg had, by robbing the soil of quantities of surface water which formerly soaked in, produced a drying-out process in the underlying strata.

29. *Effect of Vibration from Batteries.*—Another theory put forward was that the vibrations set up by the nine batteries caused a loosening of the strata along fault planes, generally shaking and accentuating the strain on the superincumbent strata. The idea was that the vibrations produced by different batteries were mostly out of phase, but at intervals it was possible for them to synchronise so that "resonance" would be set up which would cause a movement in the strata and give rise to a shock. The reason given for shocks being more frequent in the central area of the Rand was that there are more batteries in close proximity there than elsewhere, and the excavations are larger and older.

30. *Distant Volcanic Influences.*—It was stated by one witness that similar disturbances to those being experienced on the Witwatersrand took place in a tin mining district in Tasmania about thirty years ago. He remembered as many as twenty-four tremors in one day. There the tremors suddenly ceased simultaneously with the occurrence of an earthquake in the Malay Archipelago and a volcanic eruption in New Zealand. The witness predicted a similar release for the Rand, and even went so far as to promise comparative immunity from shocks in the future owing to a severe earthquake having taken place in Guatemala in September. Unfortunately his prognostication has not proved correct.

31. *Committee's Conclusions as to Cause.*—The Committee rejects all these ideas as theories or surmises of which there is no inherent probability, but for which no satisfactory evidence can be brought forward. It finds a sufficient cause in the extensive mining operations which are in progress, especially along the Central Witwatersrand, and has abundant and convincing evidence presented to it that this explanation fits all the facts and phenomena observed in connection with the shocks.

32. *Method of Support in Mining.*—The chief result of the work of the Committee mentioned in so far as it has a bearing

on shocks, is that two slices of the earth's crust, corresponding to the South Reef and the Main Reef Leader, and dipping in an average angle of 10 degrees to the south, are removed almost continuously over large areas. In the cavities thus formed portions of the original solid ground, called pillars, are left in at intervals in order to support the overlying rock and prevent it from falling in. Such pillars, which are anywhere from ten to forty feet in diameter, are supplemented by timber supports or packs built of broken waste rock or a combination of the two, or by sand-filling from the surface, and also by areas of unpayable reef, which are naturally left intact. In addition large blocks of reef, whether payable or unpayable, are left in around the shafts with the object of safeguarding these vital passages, against any danger of movement which might close them up or interfere with the regularity of hoisting operations, on which efficient mining so largely depends.

33. *Pressure on Supports.*—The broad result of these excavations is thus that the weight of the overlying mass of rock which was originally distributed over the whole area, is thrown on the pillars, on the adjacent unmined ground, and on the artificial supports provided.

34. *Supports Withstand Strain in Shallow Mines.*—As long as the depth of the reef is small, the weight to be thus taken up is also relatively small, and the supports provided withstand the strain put upon them. Further, if the area excavated is relatively small, the weight of the superincumbent mass is taken up by the surrounding intact reef, the strata immediately overlying the excavation bending through to some extent, in the same way as beams supported at their two ends would do.

35. *Deeper Mining Increases Pressure.*—As the depth of mining increases, the pressure on the pillars left in becomes greater and greater, and this is accentuated by the increased area of the excavations, which becomes so large that little of the weight of the superincumbent mass can be taken up by adjacent unmined ground.

36. *Effects of Faults and Dykes.*—In particular localities moreover, the ground is intersected or cut up into more or less isolated blocks by fault planes and dykes along which it is free to move. The effect of undermining such ground, since there is practically no adhesion to the adjacent country, is that its entire weight is thrown on the pillar supports provided, and sometimes the configuration is such that the major portion of the load will be thrown on to particular supports. Owing to the difficulty of acquiring a full knowledge of the factors involved, it is generally impossible to foretell where such pressure will be exerted and what will be its extent.

37. *Pillars Finally Crushed.*—The final result is that the pillars are strained to a greater extent than they can bear, and are crushed. Frequently the process of crushing is gradual, the sides flaking off and the mass of solid rock being slowly cracked and splintered until it is reduced to a broken heap. If the Witwatersrand strata were composed of soft rock the process of gradual crushing would most likely be invariable, and shocks north of the outcrop would be unknown. The reefs, however, that are mined, as well as the quartzites between them and above them for several thousand feet, are massive hard brittle rocks of great resisting power. Under severe pressure they are much more liable to rupture suddenly than in the case of soft rocks, such as shales.

38. *Concussion Caused by Rupture of Material.*—Sometimes, therefore, the pillar behaves precisely like any brittle material submitted to a strain exceeding its elastic limit. It gives way suddenly with a violent concussion, and in so doing transmits the shock of rupture to the adjacent strata between which it was being compressed. The shock travels as a wave from the point of origin in all directions, and is felt at varying distances according to its violence. Such a shock would be communicated with practically equal intensity to the overlying and the underlying strata.

39. *Coincidence of Shocks and Pillar Bursts.*—The Committee has had numerous instances brought to its notice of the coincidence of shocks with the bursting of pillars. In the case of the most severe shock yet recorded at the Observatory, namely, that at 4.50 a.m. on 28th September, 1915, which was coincident with a serious shattering of the shaft pillar on the Village Main Reef mine at a depth averaging 1,300 feet, the Committee was able, by an inspection *in loco*, to satisfy itself that the effects were commensurate with the presumed cause. Enormous pressure, probably aggravating several million tons, must have been brought to bear on the shaft pillar to have broken it to the extent shown.

40. *Village Main Reef Shaft Collapse.*—The incline shaft extending from the bottom of the vertical had collapsed for a distance of about 150 feet. The solid ground showing in the drives, crosscuts, and chambers at the foot of the vertical shaft was fractured over a considerable area. This accident resulted in loss of life to five natives and injury to one other.

41. *Extent of Collapse.*—The position at the Village Main Reef mine is apparently such as to invite the occurrence of such bursts. Two reefs have been extensively mined, and in addition to a few small blocks of unpayable ground at various points, there is a small block of South Reef, in extent about 60,000 square feet, lying centrally over a large pillar of Main Reef Leader 160,000 square feet in size, situated at the foot of the vertical shaft, and extending in an irregular strip over the incline shaft.

42. *Three Separate Bursts.*—On the 11th November, 1914, a bad crush, accompanied by a severe shock, took place. The most northerly part of the pillar was then affected. On the 28th September, 1915, the severe burst already mentioned took place, crushing the pillar to the south of the previous point. This was followed by another severe burst and shock at 6.50 a.m. on 30th September, 1915, affecting the pillar still further to the south down the incline. Practically the whole of the pillar

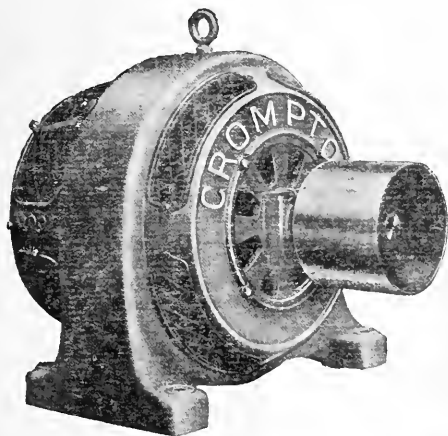
seems now to have crushed, and the extensive sand-filling around it is probably taking most of the superincumbent pressure.

43. *Ferreira Deep Shaft Collapse.*—Two other well-marked instances of the simultaneous occurrence of severe shocks and the bursting of pillars underground are the cases of the Ferreira Deep on the 2nd December, 1914, and the Cinderella Deep (near Boksburg) on the 9th May, 1910. In the case of the Ferreira Deep, the inclined shaft in the neighbourhood of the collapse lies between the South Reef and the Main Reef Leader. At this point the pillars on both reefs were made wider than in the levels above, the South Reef pillar overlapping that on the Leader, and extensive areas had been sand-filled close up to the pillars. In spite of these precautions the pressure on the pillars became excessive, and a rupture finally took place. The shaft collapsed between the fourth and sixth levels, even the rock from the sides and bottom of the shaft being forced into it at several points. There were no casualties resulting from this accident. The average vertical depth of the shaft where it collapsed was 1,510 feet.

44. *Cinderella Deep Burst.*—At the Cinderella Deep on 9th May, 1910, a severe burst took place in a stope near the bottom of the vertical shaft, at a depth of about 4,000 feet. A thickness of six feet of rock was projected in fragments from the stope face, large pieces fell from the hanging, and the footwall rose several feet in some places. Eighteen natives lost their lives on this occasion, and four others were injured. The total area excavated on the mine was small compared to those of the Central Rand, but the existence of a prominent fault plane combined with the great depth no doubt strongly accentuated the pressure. It will be noted that in this instance the stope face which burst played the part of a pillar as main cause of the shock. It is obvious that a pressure burst, from solid ground that is still to be mined, must be identical in character and effect to the rupture of a pillar. Other cases of shocks due to the sudden bursting of a stope face are on record.

(To be continued.)

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## THE WEEK IN THE SHAREMARKET.

### Broadening Tendency—Some Profit-Taking—Confident Feeling.

On the whole the best feature of the week has been the broadening tendency noticeable. There has been a little profit-taking in favourites, and an increased interest in other less known counters. Springs continue to be the medium of big business. Coal Trusts have been a little more active. Daggafonteins and Rand Klips have likewise attracted increased attention. Knight Centrals have been dealt in at higher figures. Luipaardsvleis improved on the dividend declaration. Tins were firmer on the growing quotation for the product. The lengthened list of stocks dealt in is shown below.

	Friday. 10th.	Sat. 11th.	Mon. 13th.	Tues. 14th.	Wed. 15th.	Thurs. 16th.
African Farms. . . .	9 1	10 6	9 9	9 0	10 8	10 3
Apex Mines. . . . .	5 6	5 3	5 6	5 6	5 6	5 6
Aurora Wests. . . . .	10 0	—	10 0A	—	10 0	10 0
Bantjes Cons. . . . .	13 3	13 7	13 6	13 0	12 9	12 10
Brakpan Mines. . . .	72 6	72 6	73 6	73 6	72 0	72 6
Breyten Collieries. . .	19 0	19 0	19 0	20 0	20 0	—
Brick and Potteries. . .	5 0	—	5 0	—	—	—
Bushead Tins. . . . .	0 6	0 6	0 6	0 6	0 9	0 8
Cassel Coals. . . . .	20 0	20 0	20 9A	—	10 0	10 0
Cinderella Cons. . . .	5 6	5 6	—	5 6	5 9	5 9
City and Subs. . . . .	34 6	34 6	34 9	34 0	34 9	34 9
City Deeps. . . . .	71 6	71 6	72 3	71 9	71 9	71 6
Cloverfield Mines. . .	7 9	8 0	8 4	8 0	8 0	7 10
Clydesdale Collieries. .	14 6	—	—	—	—	15 0
Concrete Construction	—	—	1 6	—	—	—
Con. Fold Fields. . . .	—	—	27 6	—	—	—
Con. Langlaagtes. . . .	30 0	—	31 0	29 0	29 0	—
Con. Main Reefs. . . .	18 9	18 6	18 6	18 6	18 9	18 6
Con. Mines Selection. .	15 0	15 0	15 0	15 6	15 6	15 6
Coronation Collieries. .	28 0	29 9	30 0	28 0	28 0	28 0
Coronation Freeholds. .	0 3	0 3	0 5	—	—	0 3
Coronation Syndicates .	2 0	—	2 0	2 0	—	2 0
Crown Diamonds. . . .	2 0	2 0	2 0	2 0	2 6	2 0
Crown Mines Deb. . . .	—	—	—	—	£100	—
East Rand Centrals. . .	5 9	6 3	6 0	5 9	6 0	5 10
East Rand Coals. . . .	3 1	3 2	3 2	3 1	3 1	3 9
East Rand Deeps. . . .	1 6	1 6	1 6	1 7	1 6	1 7
East Rand Minings. . .	11 9	11 6	12 0	13 0	14 3	14 3
East Rand Props. . . .	17 0	17 0	17 6	17 6	17 9	17 6
East Rand Debs. . . . .	£77½	£77½	£77½	£77½	£77½	£77½
Eastern Golds. . . . .	1 8	1 3	1 3	1 4	1 4	1 4
Frank Smith Dimds. . .	2 0	2 0	2 2	2 0	2 0	2 2
Geduld Props. . . . .	36 9	37 3	37 3	37 6	37 6	38 0
Glencairns. . . . .	—	2 0	—	2 0	2 0	2 0
Glencoe Collieries. . .	—	—	—	—	6 9	6 3
Glyn's Lydenburgs. . .	—	11 0	—	—	—	11 6
Govt. Areas. . . . .	36 0	35 6	34 0	33 0	33 9	34 0
Jupiters. . . . .	7 3	7 4	7 0	7 0	7 0	6 9
Klerksdorp Props. . . .	1 9	1 9	1 9	1 9	1 9	1 9
Knight Centrals. . . .	16 3	15 9	16 3	15 6	16 3	17 0
Knights Deep. . . . .	22 6	22 6	—	22 6	22 6	—
Lace Props. . . . .	6 4	6 3	6 0	5 9	6 0	5 11
Luipaardsvlei Estate. .	7 0	6 9	6 9	6 6	6 9	7 0
Lydenburg Farms. . . .	8 8	—	9 0	8 9	8 10	8 11
Main Reef Wests. . . .	8 8	8 7	8 6	8 7	8 7	8 0
Meyer and Charltons. .	102 6	102 6	102 6	102 6	102 6	102 6
Middelvlei Estates. . .	1 3	1 3	1 3	1 3	1 4	1 3
Modder B's. . . . .	115 0	116 6A	117 0	118 0	118 6	118 0
Modder Deeps. . . . .	115 0	116 0	117 0	117 0	117 0	117 6
Natal Navis. Col. . . .	17 0	17 0	17 0	17 0	17 0	17 0
New Boksburgs. . . . .	1 5	1 5	1 6	1 6	1 5	—
New Eland Diamonds. .	11 6	12 0	12 0	10 0	12 0	11 6
New Era Cons. . . . .	7 7	8 0	7 9	7 9	8 1	8 3
New Geduld Deeps. . . .	3 11	3 11	4 0	3 11	3 11	3 11
New Heriots. . . . .	—	52 6	54 0	52 6	—	53 6
New Kleinfonteins. . .	29 6	31 9	31 6	30 9	29 9	30 0
New Modderfonteins. .	—	312 6	—	317 6	—	—
New Rietfonteins. . . .	0 9	1 0	—	0 9	—	1 0

\* Buyers. † Sellers. A Odd lots.

	Friday. 10th.	Sat. 11th.	Mon. 13th.	Tues. 14th.	Wed. 15th.	Thurs. 16th.
New Uniefs. . . . .	11 0	11 0	11 0	11 0	11 0	11 0
Nourse Mines. . . . .	15 0	15 0	15 0	15 0	15 6	15 0
Pretoria Cements. . . .	64 6	65 0	65 0	63 9	64 0	63 6
Princess Estates. . . .	—	4 0	—	—	4 0	4 0
Rand Collieries. . . . .	3 3	3 6	3 6	3 6	3 6	3 6
Rand Klips. . . . .	6 7	6 9	7 9	7 4	7 11	7 11
Rand Nckus. . . . .	2 0	1 10	1 10	1 10	1 10	1 10
Randfontein Deeps. . . .	3 10	3 10	4 0	4 0	4 0	4 0
Randfontein Estates. . .	—	11 3	11 3	11 6	11 0	—
Roberts Victors. . . . .	8 6	9 0	8 6	8 6	9 6	8 6
Robinson Deeps. . . . .	22 0	19 0	22 0	21 0	22 0	22 0
Rooibergs. . . . .	12 6	13 0	12 9	12 9	14 0A	13 6
Rodepoort Uniteds. . . .	7 9	8 0	8 0	8 0	8 0	7 10
Ryan Nigels. . . . .	—	2 3	2 3	2 3	—	2 3
Shebias. . . . .	2 0	2 3	2 0	—	1 6	—
Shinner Deeps. . . . .	2 6	2 0	2 0	—	2 0	2 0
S.A. Breweries. . . . .	29 0	30 0	—	—	—	—
S.A. Gold Mines. . . . .	—	—	15 0	—	—	—
S.A. Lands. . . . .	4 2	4 1	4 2	4 4	4 1	4 0
Spurings Mines. . . . .	55 3	56 9	57 0B	—	56 6	55 9
Sub-Nigels. . . . .	11 6	11 6	11 6	—	11 6	—
Swaziland Tins. . . . .	23 6	23 0	23 0	23 0	23 0	—
Transvaal Coal Trusts . .	59 0	60 0	61 0	61 6	62 0	—
Transvaal Lands. . . .	—	15 0	15 0	15 0	15 0	—
Tudors. . . . .	0 6	2 0	2 0	—	2 0	2 0
Van Dyks. . . . .	3 3	3 3	3 3	3 3	1 6	3 3
Van Ryn Deeps. . . . .	60 3	62 3	63 3	63 0	64 0	63 9
Van Ryn Estates. . . . .	42 6	—	42 6	41 6	41 6	41 6
Village Deeps. . . . .	33 6	33 6	31 0	33 0	33 6	30 0
Village Main Reefs. . . .	—	—	—	20 6	—	20 6
Vogel Con. Deeps. . . .	1 4	1 5	1 6	1 8	1 7	1 7
Welgedachts. . . . .	—	—	16 0	—	—	—
Western Rand Estates . .	1 0	1 0	1 2	1 0	1 3	1 3
Witbank Collieries. . . .	41 6	41 6	41 6	41 6	41 6	—
Wit. Deeps. . . . .	23 6	23 6	23 3	24 0	23 6	23 6
Woluhuters. . . . .	10 6	10 6	10 9	10 6	10 6	10 6
Zaaiplaats Tins. . . . .	11 9	11 9	12 0	12 4	12 6	12 6

\* Buyers. † Sellers. A Odd lots.

### ANSWERS TO CORRESPONDENTS.

All inquiries addressed to the Editor must bear the writer's name and full address. We cannot reply to inquiries by letter, but telegrams with replies prepaid will be answered. Correspondents are requested to write their names and pseudonyms distinctly.

"Lauretius" (Kroonstad).—(1) Yes; promises to be a steady dividend payer. (2) Yes, as a "lock up" they should come right some day.

"J. F." (Capetown).—There is no reason to sell at present prices.

"R.A.T." (Boksburg).—The scheme is now withdrawn. Write to the Economic Building Society, Palladium Buildings, the owners of the farm in question.

"LAN" (Durban).—(1) Dividend was paid on February 4. You had to be registered on December 31. (2) Speculative. Impossible to predict what will happen.

"KAROO" (Port Elizabeth).—(1) and (2) Both have equally good prospects. (3) Not for many years. (4) Certainly it may turn out valuable; but the Cassel Coal Company has option to purchase half of its interest.

"DAGGA" (Bulawayo).—(1) It is not possible to say yet. (2) Yes. (3) Your interpretation is correct.

"SUBSCRIBER" (Natal).—Next week.

## CHROME IRON ORE.

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## MINING EXAMINATIONS.

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## THE WEEK IN THE MINING MATERIAL AND ENGINEERING TRADES.

**Lull in the Mines Buying—Modderfontein Making Nitrate of Lead—Marvellous Progress of Steel in Australia—Paints and Oils Stationary.**

BUSINESS on the Commercial Exchange has been very quiet this month. According to the best information on the subject, the mines have checked their buying to something like twenty to twenty-five per cent. less as compared with the early part of February, when several African ships were torpedoed, and certain precautions were taken to secure everyday lines to provide against untoward emergencies. At the present moment the mines have sufficient stores to cope with all and every likely contingency for many months to come, therefore it is not surprising that a lull has occurred in the demand. There is very little gossip going the rounds this week. The leading talk is about the fighting in German East, where so many of our Johannesburg men are fighting, and it often happens that when enquiries are made about so-and-so it is found that he also has joined the forces. In connection with the war, every scrap of news, more particularly the casualties, is eagerly examined to ascertain if any of our immediate relatives and friends have met with mishaps. Now that the business has gone slack on the Commercial Exchange, there is a lot of quiet speculation going on with the sister institute, the Stock Exchange, where much interest and not a little gambling is taking place in the shares of the Far Eastern Rand gold mining propositions. The concern manifested in the Far Eastern Rand is very real with the members of the Commercial Exchange, as that is the district from where many large orders are anticipated, immediately developments commence in earnest out that way. In this respect two pioneer Johannesburg men were talking the other day, and the conversation turned on the subject of again pioneering to pastures new, when one replied: "We are getting too old, but even if I were a young man again, I should repair to the Springs and the Far Eastern Rand and be quite content to reap a rich reward for my energies and small capital."

### NEW INDUSTRIES.

The Modderfontein Dynamite Factory, within an easy ride of Johannesburg, as one often sees a commercial van or the company's wagons in town, has made quite a new departure in manufacturing nitrate of lead, as a substitute for acetate of lead. This was formerly imported into South Africa in large quantities for use in the gold reduction works, but now the overseas supplies have practically failed, as well as having advanced greatly in value, when anything does come to hand. With commendable enterprise the local factory took the matter in hand, particularly as the manufacture of dynamite gives a residue of certain acids very suitable to assist in the production of nitrate of lead. The supply of scrap lead was soon exhausted, but fortunately a South African mine supplied virgin lead very suitable for the work, thus enabling the Modderfontein people to provide nitrate of lead to the Witwatersrand, and other Transvaal mines as well as Rhodesia. The local cost has been less than would have been the case had the supplies of acetate of lead been imported regularly, and another point for congratulation is that the nitrate is making an excellent substitute. This innovation may result in the auxiliary lead products being expanded, as white and red leads can be made here at a price. The prospective difficulty, or question, is as to how long white lead will keep up to its present startling high price of about 70s. per 100 lbs., which would pay excellently well, and big money could be secured to purchase the best machinery and up-to-date buildings, but alas, how will matters stand when the war is over? It is very satisfactory to note from time to time how our home industries are gradually creeping into existence, but no doubt the block in the roadway for big expansion, let the prospects be never so good, is the cankering fear of the future. Therefore enterprisers would like to see a little farther ahead and get some idea of the happenings when the war is finished, as they naturally say it cannot last for ever, and they do not wish to be left "to nurse the baby."

### THE IRON AND STEEL TRADES.

There is still a gradual advance in the price of iron and steel in Johannesburg, but nothing like what is ruling in Britain. For example, the sales taking place to-day in the local Exchange are quite ten per cent. below the landed cost here of iron and steel purchased now from the Cleveland iron market. According to the latest advices from that market, received by this mail, it says that further sensational movements have taken place in the Cleveland iron market, and on balance values show an advance of 4s. 4d. on the (mail) week. Stocks are rapidly decreasing, and these conditions promise to continue, so that in all probability we have not yet seen the top. There is practically no change in the conditions ruling in the steel trade. Government requirements are ever on the increase, and manufacturers generally find difficulty in covering their requirements. We quote Cleveland at 92s. 9d. cash, 93s. 2d. one month, and 94s. 2d. three months. It will readily be perceived that forward values are higher than spot cash, which is a sure indication that holders anticipate a still further advance. In respect of the pioneer iron and steel industries connected with the Witwatersrand, every lover of South African industries should be proud, as the necessary plant, accompanied by the best of brains, to say nothing about the pluck required to take the first initial step, cannot be too highly commended. However, we have a long way to go in the secondary stage of producing South African pig iron to replace, in part at all events, the scrap iron now solely used. For encouragement to go forward, it is hopeful to read how things in the iron and steel trades are progressing by leaps and bounds in Australia. The cabled summary of the Broken Hill Company is most promising, and they proudly refer to the fact that the Imperial Munitions Department has given their first order in Australia, this month of February, for 500 tons of steel. Now this first consignment may even pass the Cape, therefore it is no stretch of imagination to anticipate Australian supplies coming to South Africa. The report also states that the Broken Hill new iron and steel works, standing on 96 acres of ground are nearing completion, and will cost over £2,000,000. These works provide for all classes of iron and steel products, including steel rails, for which there is a constantly increasing demand, owing to the rapid extension of the Australian railways. Already contracts have been arranged for £10,000,000 worth of rails for these railways, while the demand for galvanised iron, steel wire, etc., is unlimited. It is only a few years ago when the Australian papers announced the fact of their success, after much expense, trials, and disappointments, that serviceable pig iron had at last been produced. Their railways have given them a very substantial market, and assisted by the world-wide war conditions, a huge success is anticipated, if the price of the 8s. paid shares is any indication, as they are being dealt in at 57s. South Africa is in somewhat a similar position as Australia, as our railway requirements for steel rails are immense and must ever be an increasing factor, therefore it is pretty self-evident that we also shall supply these with steel rails from our own iron ores smelted with our own coal. Alteration in prices: The following are the latest prices: Round imported iron, up to 1 in., 27s. 6d.; 1½ in. to 2 in., 13s. 6d.; 2½ in. to 6 in., 25s. Do., squares, up to 1 in., 27s. 6d.; 1½ in. to 2½ in., 13s. 6d.; 2½ in. to 5 in., 25s. Flats, 3-16 in., 37s. 6d.; all from ½ in. up, 25s. Angles, ½ in. to 3-16 in., 30s.; ½ in., 27s. 6d.; 5-16 in. to ¾ in., 25s., excepting 5 x 4 x ½.

### BUILDING AND BUILDING MATERIALS.

The demand for stock bricks, and wire cuts, is fairly good, both for town and suburbs. It is chiefly for private dwellings, alterations and additions thereto. Timber is also in fair demand with prices still creeping up, and it is the first time our standard list registers 1s. per foot for standard sized deals in long lengths. Galvanised corrugated iron has



also advanced, and 12 feet lengths of the 24 gauge is now marked up to the high level of 10d. per foot. As regards paints, leads, turps, etc., the idea is that the present high values may remain stationary for a time. It was feared at one time that holders might keep back certain of the leading lines for higher prices, but seeing that stocks are not held by any one section in sufficient quantities to do a little cornering, that question can be relegated to the background for the present. The fact is that consignments keep dribbling through from overseas in sufficient quantities to keep the market healthy. Plate and window glass remains at the same price, with fair stocks, and fair business.

#### THE SECOND-HAND MARKET.

The bulk of the everyday lines gradually gets smaller, as the second-hand building material and disbanded mining machinery and stores become less plentiful. There is a constant enquiry for pipe fittings from 5in. to 12in., as well as different sizes of piping. Mine tram rails from 16lb. to 24lb. are exceptionally scarce. The trade with Rhodesia is much slower and seemingly enquiries are less. There are indications, however, that they are short of detonators and chemical reagents, and temporary supplies have been sent from here, until those on the water arrive.

#### REVISED PRICE LIST.

Approximate war prices, subject to quick change.—Mining and building hardware: Iron, imported, round up to 1 in., 27s. 6d.; 1½ in. to 2 in., 13s. 6d.; 2½ in. to 6 in., 25s. per 100 lbs. Do., square, up to 1 in., 27s. 6d.; 1½ in. to 2½ in., 13s. 6d.; 2½ in. to 5 in., 25s. Plats. 3-16 in., 37s. 6d.; all from ½ in. up, 25s. Angles, ½ in. to 3-16 in., 30s.; ½ in., 27s. 6d.; 5-16 in. to ¾ in., 25s., excepting 5 x 4 x ¾ in.: mild steel bar, 3d. lb.; drill, 5½d. lb.; tool, 7½d. to 9d. lb.; steel plates, 10ft. x 4ft. x 1-16in., 24s. 6d.; do., ½ in. and 3-16 in., 23s. 6d.; ¼ in. and upwards, 27s.; 10 ft. x 5 ft. x 1-16 in., 28s. 6d.; ½ in. and 3-16 in., 25s.; 10 ft. x 6 ft. x 1-16 in., 27s. 6d.; 3-16 in. x 10 ft. x 4 ft. 26s.; ¼ in. up, 10 ft. x 4 ft. 25s. to 27s.; hexagon bolts, ¾ in. to 3 in., 8d. per lb.; over 3 in., 7d. lb.; ½ in. up to 2½ in., 45s.; 2½ in. to 6 in., 42s. 6d.; 6½ in. and over, 40s.; ¾ in. up to 2½ in., 37s. 6d.; 2½ in. to 6 in., 35s.; 6½ in. and up, 32s. 6d.; ¾ in., ¾ in., and 1 in. up to 2½ in., 32s. 6d.; 2½ in. to 6 in., 30s.; 6½ in. and up, 29s. per 100 lbs. Nuts, ¾ in., 9d. lb.; ½ in., 50s.; ¾ in. to 1½ in., 47s. 6d.; 1½ in. to 1¾ in., 52s. 6d. per 100 lbs.; 2 in., 7½d. per lb.; washers, ¾ in. and under, 30s., and above that size, 30s. per 100 lbs.; shoes and dies, 30s. to 32s. 6d. per 100 lbs.; rails, £15½ per ton; picks, 4 lbs., 22s. 6d. per doz.; shovels, 32s. 6d. to 42s. 6d. per doz.; hammers, drill, 6d. to 9d. lb.; hammer handles (best American), 14 in., 3s. 6d., 24 in., 5s. 6d., 30 in., 7s. 6d., 36 in., 10s. 6d. per doz.; metal, anti-friction, 1s. per lb.; galvanised iron, 24 gauge, 6 ft. to 10 ft., 94d., 11 ft. 9½d., 12 ft. 10d.; 26 gauge, 6 ft. to 10 ft., all lengths about 7½d. to 7¾d.; flat galvanised, 18 to 24 gauge, 32s. 6d.; 26 gauge, 34s. 6d. 100 lbs.; floor brads, 27s. 6d.; ceiling, 27s. 6d.; wire nails, 27s. 6d. to 32s. 6d.

per 100 lbs.: solder, 50 per cent., 1s. 2d. per lb.; locks, rim, 45s.; mortice, 60s. doz.; barbed wire, 20s. to 22s. 6d. 100 lbs. coil.

Timber: Deals, Baltic, 9 x 3, up to 16 ft., 10½d.; over, 10¾d. to 1s. (Oregon, 10¾d.); flooring, 4½ x ¾ and 6 x ¾, 5½d. to 5¾d. per sq. ft.; do., 4½ x 1½, 6½d. to 6¾d.; and 6 x 1½, 6½d.; Oregon edge grain, 5½d. and 6½d.; ceilings, 6 x ¾, 3d. to 3½d. per sq. ft.; Oregon, 4 x ¾, 4½d.; pitch pine, 6s. 6d. per cub. ft.; Oregon, 5s. per cub. ft.; clear pine, ½ in. x 12 in., 7½d. per ft.; 1 in x 12 in., 8d.; teak, small planks, 15s. per cub. ft.; do., large, 16s.; jarrah, 8s. 6d. per cub. ft.; poplar, 1 in. x 12 in., 8d.; scantling, 9 x 3, 10d. to 10½d. per ft.

Bricks, cement, lime, etc.: Cement, nominal, 34s. 6d. per cask; Pretoria Portland, 9s. 3d. per bag; 8s. 3d., truck loads; lime, white, 7s. 6d.; truck loads, 6s. 6d., slacked; do., 5s.; blue, 3s. 6d.; plaster lime, 4s.; bricks at kiln, stock, 35s. to 40s.; wire cuts, 40s. to 50s. pressed, 65s. per 1,000, road transport now normal; salt and white glazed bricks, £27 10s per 1,000; tiles, roofing, £17½ square; glazed tiles, 10s. 6d. to 17s. 6d. yard; paving cement tiles, 8s. 6d. yard laid; terra cotta tiles, £15 per 1,000; reinforced concrete columns, 6ft. plain, 21s. 6d.; fluted, 24s.; fireclay bricks, £9½, good average, per 1,000; clay chimney pots, 80s. per doz.; fireclay, 37s. 6d. ton on rail.

Oils, paints, lead, oxides, glass: Linseed, raw, 30s. boiled, 30s. per 5-gall.; white lead, 65s. to 70s. per 100 lbs.; turpentine, 54s. 2/4 galls.; coal tar, imported, 10s. to 11s. per 5 galls.; oxide in oil, 30s. to 32s. 6d. per 100 lbs.; dry oxide, 21s. to 22s. 6d.; S.A. crude oxide, 12s. 6d.; linseed oil putty, 4s. 6d. per 12½lb. bladders; 30s. casks of 100 lbs.; grease A.F. axle, 23s. 6d. to 25s. per 100 lbs.; tallow, 9d. per lb.; White Rose paraffin, 14s. 6d. 2/5; Laurel do., 14s. 3d.; petrol, 24s. 6d. 2/4; motor oil, 6s. to 7s. 6d. per gallon; lubricating oils, 24s. per case; cylinder, 30s.; paints in tins, 8d. to 9d. per lb., according to quantity, and if ordered to be mixed, 10 per cent. on pre-war rates. British plate-glass, ¼ in., 3s. 6d.; window, 16 oz., 1s. to 1s. 3d. ft.

Chemicals: Mercury, £17 10s. per 75 lb. bottle; bichromate potash, 1s. 6d. lb.; chlorate, 2s. 6d. lb.; permanganate, 7s. 6d. lb.; alum, 9d. lb.; carbolic acid, 5s. 6d. lb.; borax, 66s. 100 lbs.; cyanide soda, 1s. 4d. lb.; hypo, 1s. lb.; acetate lead, 67s. 6d. 100 lbs.; litharge (assay), 57s. 6d., (commercial) 37s. 6d. 100 lbs.; zinc sheets and blocks, 1s. 3d. lb.; plumbago crucibles, 4½ per number.

Electrical Goods: Lamps, high volts., British, Holland & American, 14s. to 21s. wholesale, and 21s. to 27s. doz. retail; carbon lamps, 7s. 6d. per dozen; pure rubber flex, 9d. to 1s. per yard; 3/20 coils of wire, 27s.; do., 3/22, 23s.; tubing, 12s. to 13s. 100 ft.; keyholders, 2s. 6d. each; round blocks, 3½ in., 4s. doz., local; lamp holder cord grips, 15s. doz.; switches, 5 amp., 12s. to 13s. doz.; British glass shades, 24s. to 36s. doz.; Bohemian shades finished; porcelain shackles, 14s. 6d. doz.; do., bobbins, 15s. to 16s. 6d. 100; cleats, 18s. per 100; P.O. insulators, 18s.; motors, 3 h.p., about £30 new.

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## Engineering Notes and News.

### THE DISTRIBUTION PLANT OF THE JOHANNESBURG MUNICIPAL ELECTRIC SUPPLY SYSTEM.—V.

#### A Vast Municipal Area—Domestic, Industrial and Lighting Arrangements—Interesting Technical Description.\*

[By J. H. DOBSON, M.Sc., M.Eng., M.I.M.E., M.I.E.E., A.M.Inst.C.E.]

**THE RETURN CIRCUIT.**—Direct current is sent from the power station by cables insulated from earth, which feed the overhead equipment. The current flows from the overhead equipment through the motors on the tramcars, then passes through the wheels of the tramcars on to the tramway rails. In general the rails have large current carrying capacity, but, although this is the case, certain electrical pressure is required to send the return currents along the tramway rails back to the power station. In order to reduce the electrical pressure which is absorbed by the return current along the tramway rails, all rail joints are carefully bonded. Under certain conditions the tramway currents leave the tramway rails and flow through other paths of conductivity in the earth. Such paths may be along water pipes, along underground cables, gas pipes, etc., and in very moist earth (which is electrically conductive) the tendency to leave the tramway rails, as indicated, would be greater than in dry non-conductive earth. Owing to this tendency for the return current to leave the tramway rails, the influence of those who have vested interests in water and gas pipes and underground cables has resulted in the various countries of the world limiting the magnitude of the current in tramway rails by the adoption of special Government rules and regulations. The said Government rules and regulations have a definite effect upon the design of a distribution scheme for a power supply to a tramways system—i.e., an engineer unrestricted by Government rules and regulations could lay out a cable scheme for power distribution to a traction system on much more economical lines than would be the case where Government rules and regulations have to be adhered to. The chief reason is that, generally speaking from the engineering point of view, it costs nothing in copper for the return of current to the power station along the tramway rails, but when the magnitude of the current allowed to flow in the tramway rails is limited by Government rules and regulations, large and expensive copper cables (or the equivalent) have to be laid down to assist the tramway rails to return the current to the station. The fact of currents leaving tramway rails is common to every traction system in the world, and it is generally held that where direct currents leave the tramway rails to enter water or gas pipes or underground cables, no damage is done; but where tramway direct currents leave water or gas pipes or underground cables to get back to the power station, damage by electrolysis may result, and electricity is somewhat different to water and gas in that the whole of the electricity sent out from a power station must likewise all return to the power station. From the foregoing it will be clear that the area immediately surrounding a power station is a zone of danger from the point of view of electrolysis, as in this zone any currents which have left the tramway rails flowing in water or gas pipes or underground cables must necessarily leave the same and return to the power station. The points where the currents leave the water or gas pipes or the sheathing of underground cables have to be specially dealt with by providing an easy path for the currents to leave them in order to get back to the negative electric main in the power station. The original design of the cable system for power supply to the Johannesburg trams was such as to cover not only the tramway routes opened in 1906, but also with slight modifications the extensions which have been carried out since that date. The original consulting engineers had a free hand in designing an electric cable system from the point of view of engineering requirements and economy only, there being no Government regulations. The conditions at that time were such that the Government had not found it necessary to introduce legislation restricting conditions of running on tramway systems which could be applied to the Johannesburg tramways, and they were opened to traffic without examination or test by any Government authorities. Accordingly, the traction system did not conform with the British Board of Trade rules and regulations governing traction systems as regards the general layout of the system, and there were no arrangements installed for obtaining such records as are usually required on tramway systems where Government regulations exist. Of course, the conditions in Johannesburg are widely different to those in Europe. In particular there is the exceptional dryness of the Johannesburg climate and soil (no waterways, rivers or canals), and the obvious fact that it would have taken a large amount of and additional capital to comply with such Board of Trade rules; and finally because at that time there were no Government rules and regulations in existence in the Transvaal. Under these circumstances the Council's consulting engineers did what every engineer would have done to make the system of traction for the Municipal Council of Johannesburg as economical as possible. Accordingly, all the electric power was sent from the central power station through

the various direct current tramway feeders to the overhead equipment, and the return circuit was that of the tramway rails themselves, excepting at Market Square, where cables up to a total section of two square inches were bonded on to the rails and connected to the traction negative busbar at the station, in addition to the stout copper connections bonded on to the tram rails opposite the power station in Market Street. The busbars were connected to earth on to the large water pipes passing the power station, in accordance with established custom where the dryness of the soil, as in Johannesburg, precludes a good connection to earth being made in any other way. There were thus no rail return feeders with or without "boosters," and no tramway sub-stations, and the operation of the system was delightfully simple, and everything was controlled from the main switchboard. Since the inauguration of the system in 1906 there has been considerable development. At the end of 1908 there were 45 track miles, and at the end of 1914 there were 66 track miles, whilst the number of passengers carried in 1908 was 16,938,417 and in 1911 was 30,810,900, and the tramway traffic at such places as the Zoo at Parktown, Yeoville and the Jeppestown is now particularly heavy. Subsequent to the inauguration of the tramways system, the Government Telephone Department has put down a reticulation of underground telephone cables. In 1911 an Act was passed in the Union Parliament called the "Post Office Administration and Shipping Combinations Disengagement Act, 1911."

(To be continued.)

## S.A. MINING YEAR BOOK. 1915.

BY S. R. POTTER  
(Editor, "S.A. MINING JOURNAL.")

Vol. I.

ANNUAL MEETINGS AND  
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\* Paper read before the S.A.I.E.E.

## Company Meetings.

### THE NEW TRANSVAAL CHEMICAL COMPANY, ANNUAL MEETING.

The 20th ordinary general meeting of shareholders of the New Transvaal Chemical Co., Ltd., was held on Thursday, 6th January, 1916, at Winchester House, Old Broad Street, London, E.C., Baron Emile Beaumont d'Erlanger in the chair.

Baron D'Erlanger: A quorum of members being present, I will call upon the secretary to read the notice convening the meeting, and also the auditor's certificate.

The Secretary then read the notice convening the meeting and the certificate.

Baron D'Erlanger: Gentlemen, I suppose you will take the report and accounts as read, and I will follow the usual custom of giving you a few explanations before asking you to confirm the report and accounts. These are the first accounts submitted to you since the re-arrangement of capital consequent upon our agreement with Messrs. Lever Brothers, which was duly sanctioned by you last year. Firstly, the old Preference shares were converted into First Preference shares having a 6 per cent. cumulative preferential dividend, and received a bonus of 15 per cent. in 6 per cent. cumulative First Preference shares, but are not to participate in any surplus profits; and, secondly, the old Ordinary shares were converted into "A" Preference shares entitled to a cumulative preferential dividend of 8 per cent. per annum, but are not entitled to participate in any surplus profits, and they also received a bonus of 15 per cent. in 6 per cent. cumulative First Preference shares. This operation accounts for the issue of 200,000 First Preference shares and 150,000 "A" Preference shares, with a further (at the date of the balance-sheet now before us) £626, less amount already issued. The question I would put to myself in examining these accounts, and which, in the light of the figures before us to-day, and the progress made since June 30th last year, I hope to answer to your satisfaction, is: Can the public, amongst whom the First Preference and the "A" Preference shares are so widely distributed, sleep safely upon their investments? My solicitude, however, is not confined to the investing public; it is none the less for the Ordinary shares, though held entirely by one firm, Messrs. Lever Brothers. Having been connected with this company for so many years as its chairman, and having seen it emerge triumphantly from the tribulations and vicissitudes of childhood, having seen it follow a career of uninterrupted prosperity and then fall a victim to adverse and fickle fortune, I am in the moral, as well as the financial sense, interested in its return to commercial and financial prosperity. To return to the balance-sheet, you will see the share capital consists of 200,000 First Preference, 150,000 "A" Preference, and 150,000 Ordinary shares, or a total of 500,000. Other large figures we have to account for on the debit side of the balance-sheet are £19,505 5s per cent. First Mortgage Debentures, redeemable at par on 1st July, 1916, and £110,450 secured advances granted to us by the National Bank of South Africa, which is not repayable (except at our own wish) until one year after the termination of war. The sum of £31,604 sundry creditors is made up of a very great many items, mostly temporary fluctuating balances in the ordinary course of business. You may rest assured that our assets on the right-hand side of the balance-sheet adequately represent our liabilities. The value of the factories, plant and equipment has been constantly written down year after year, and all I can say is that it would take a very great deal more capital to acquire the land and erect the factories of the New

Transvaal Chemical Company than the figures in our books. The money invested in the South African Oil and Fat Industries, Ltd., amounts approximately to £200,000, one-third of which represents share capital, the other two-thirds advances covered by stock and stores. Our subsidiary company has now for several months past been earning regular and substantial profits, and the investment is fully worth, I believe, the book value; in fact, I hope to live to see it worth a great deal more. Our next largest investment comprises shares held in the Premier Whaling Company, Ltd. This company made a small profit last year—some £5,000—and in the year 1915 it is expected to do about the same. We have also some £24,000 invested in the Machavie Gold Mine, Ltd., from which we have, as yet, derived no dividend. Our stocks and stores are valued at £101,000; our debtors £71,725, bills receivable £17,270, and our cash £2,800; or a total of £187,800; and these items are worth (I need not add) their full value. It will therefore be seen that, ignoring the stocks of our subsidiary company, the South African Oil and Fat Industries, Ltd., and taking the Lever Brothers shares at their market value, our liquid assets exceed the cash liability by £350,000, and if we included the South African Oil and Fat Industries stocks, it would exceed it by well over £400,000, and naturally this is a very strong financial position. It is very desirable that any company should become independent of what I might call permanent financial facilities, and Messrs. Lever Brothers, fully realising this, have asked for the Ordinary share capital to be increased by £150,000 by the creation of 150,000 Ordinary shares of £1 each, and the right of subscription to which is reserved in the first instance to the Ordinary shareholders at par. Turning to the profit and loss account, the trading profit of the New Transvaal Chemical Company for the year ending 30th June, 1915, amounted to £36,349, as compared with £27,256 in 1914, and £35,557 in 1913, a proof that we have turned the corner, though we are not yet so far as I could wish to see around it; but we have to add £22,500, the dividends on the Lever shares, and, after making on the debit side the usual charges, including £8,600 for depreciation, we have a distributable profit of £35,000, against £9,500 in 1914, and £23,000 in 1913. A point I would draw your attention to is that Messrs. Lever Brothers have about £22,500 to the debit of this company by way of dividend, and only drew out this year £12,000 by way of dividend on the 150,000 shares subscribed. They will reap, but I am justified in saying they had to sow. An experience of over 30 years in industrial finance has confirmed my opinion that any industrial concern will have to face days of difficulties and crisis, and it will also have days of ease and prosperity—sickness and health alternate in all human affairs. Secondly, the value of an industrial concern is dependent upon the man who (if you will excuse the colloquialism) is the "boss of the show." A worthy successor may be found for the man who retires, or dies, but none can be found able to run the business while he is in harness in a manner so essential to success. Lever Brothers would not have been what it is to-day without Sir William Lever. Our company would not have been what it was, and what it is to-day, without Dr. Schlesinger Delmore. I lay very great stress on this point; indeed, had it not been for the severe illness which assailed the Doctor, our business would not have experienced the difficulties or not known the difficulties it has. The

best proof of this assertion I can give you is that within a few months of his recovery and return, the factories at Delmore and Durban began to run smoothly and at increasing profits. No doubt our late agreement of unity of interests with Messrs. Lever Brothers has had its effect, but it is only an additional effect in our better profit. I will close my address by stating that Mr. Deutsch is now visiting our property, and on the 12th of this month Sir William Lever and Mr. Schlesinger are going out to the Cape to confer with the Doctor. I wish them, in your name as well as in the name of our colleagues, a very prosperous journey, and may God grant that on arrival in South Africa they may be welcomed with good news from our armies, and return in good health and again be received here with better news still. (Applause.)

I will now move the resolution, but before putting it to the vote I will answer any question which may be addressed to me.

No questions were asked.

The Chairman's motion for the adoption of the report and accounts, and the resolution for the declaration of the dividends having been duly seconded by the Hon. Cecil A. Campbell, were carried unanimously.

The retiring directors, Baron Emile Beaumont d'Erlanger and Mr. F. Deutsch, were re-elected unanimously on the motion of the Hon. Cecil A. Campbell, seconded by Mr. R. A. Murray.

Messrs. Deloitte, Plender, Griffiths and Company were re-elected auditors of the company.

Mr. W. F. Andrews: May I, now I am on my feet, express appreciation, as a shareholder, of our position, which I feel is very largely due to Messrs. Lever Brothers, Ltd., and of Dr. Schlesinger Delmore, who has been so long connected with the company. Of course, one cannot forget that when the Preference shares were issued some time ago the Doctor expressed himself very hopeful that not only would a dividend be earned on the 150,000 shares, but a good dividend, and that the dividend would continue to increase. But the best-laid schemes of mice and men "aft gang a-gley," and we do not want to worry about the past; the future appears satisfactory, and I should like to express, on behalf of the shareholders, an appreciation of the services rendered. (Hear, hear.)

The Chairman: I am very much obliged to you for the kind words you have spoken, and which will be duly conveyed to the other side of the ocean, where I am sure they will be equally appreciated.

I beg to move that the Board be and are hereby authorised to increase the capital of the company to £650,000 by the issue of 150,000 new Ordinary shares of £1 each, and that such new Ordinary shares be created accordingly and rank in all respects *pari passu* with the existing Ordinary shares of the company, and be offered by the Board in the first instance for subscription at par to the holders for the time being of the said existing Ordinary shares in the company in proportion as nearly as may be to the number of Ordinary shares held by them respectively, and at such time or times as the Board may think fit, with power to the Board to dispose of any of the said shares offered to any shareholders as aforesaid and declined or not accepted by them within such time as the Board may appoint to such persons and upon such terms as the Board may from time to time think fit.

The resolution was duly put to the meeting and carried unanimously, which terminated the business of the meeting.

## Transvaal Gold Mining Estates, Ltd.

(Incorporated in the Transvaal.)

### DECLARATION OF DIVIDEND No. 20.

A Dividend of 10 per cent. (2s. per share) has been declared by the Board for the period ending 31st March, 1916, payable to Shareholders registered in the books of the Company at the close of business on 31st March, 1916, and to holders of Coupon No. 20 attached to Share Warrants.

The Transfer Books will be closed from the 1st to 7th April, 1916, both days inclusive.

It is intended to post the Warrants in payment of this Dividend on or about 4th May, 1916, but irregularity in the mail service may render it necessary to defer the posting by one or even possibly two weeks. Those despatched from the London Office to persons resident in the United Kingdom will be subject to a deduction of English Income Tax.

Coupon No. 20 attached to Share Warrants will be payable on or after 5th May, 1916, at the London Office of the Company. Coupons must be deposited Four Clear Days before being paid, and, unless accompanied by Inland Revenue Declarations, they will be subject to a deduction of English Income Tax.

By Order of the Board,

TRANSVAAL CONSOLIDATED LAND AND EXPLORATION CO., LTD., *Secretaries.*

W. E. S. LEWIS, Secretary.

Head Office: The Corner House,  
Johannesburg, 15th March, 1916.

## KNIGHT CENTRAL, LIMITED.

(Incorporated in the Transvaal.)

### NOTICE TO SHAREHOLDERS.

NOTICE IS HEREBY GIVEN that the Nineteenth Ordinary General Meeting of Shareholders in the above-named Company will be held in the Board Room, Cullinan Buildings, Johannesburg, on Friday, the 12th May, 1916, at 11 a.m.

#### BUSINESS:

1. To receive the Directors' Report, Financial Statements, etc., for the year ended 31st December, 1915.
2. To elect Directors in the place of the present Board, who retire in terms of the Company's Articles of Association, but are eligible and offer themselves for re-election.
3. To appoint Auditors in the place of Messrs. C. L. Andersson & Co. and Mr. Charles Stuart, who retire, but are eligible for re-appointment, and to fix their remuneration for past services.
4. To transact any other business which may be transacted at an Ordinary General Meeting, or which is brought under the consideration of the Meeting by the Report of the Directors.

The London Transfer Registers of the Company will be closed from the 10th to the 15th April, 1916, both days inclusive, and the Head Office Transfer Registers will be closed from the 8th to the 26th May, 1916, both days inclusive.

Holders of Share Warrants to Bearer desiring to vote, must deposit their Share Warrants at the Head Office of the Company, Johannesburg, at least twenty-four hours before such General Meeting, or at the London Office of the Company, Salisbury House, London Wall, E.C., on or before the 13th April, 1916, together with a statement in writing of the name and address of the holder of the warrants, in exchange for which a Certificate will be given entitling the holder to attend and vote at the Meeting in respect of the shares specified in such Certificate.

By Order of the Board,

H. G. L. PANCHAUD, Secretary.

Head Office, Johannesburg,  
3rd February, 1916.

## WITWATERSRAND DEEP, LIMITED.

(Incorporated in the Transvaal.)

### NOTICE TO SHAREHOLDERS.

NOTICE IS HEREBY GIVEN that the Eighteenth Ordinary General Meeting of Shareholders in the above-named Company will be held in the Board Room, Cullinan Building, Johannesburg, on Friday, 26th May, 1916, at 11 a.m.

#### BUSINESS:

1. To receive and consider the Statement of Profit and Loss Account and Balance Sheet, and the Directors and Auditors' Reports for the year ended 31st December, 1915.
2. To elect two Directors in the place of Messrs. C. S. Goldmann and F. G. C. E. Robellaz, who retire by rotation, in terms of the Articles of Association, but, being eligible, offer themselves for re-election.
3. To appoint Auditors for the ensuing year in place of Messrs. Douglas, Low & Co., and Mr. H. J. Lamb, who retire, but are eligible for re-appointment, and to fix their remuneration for the past Audit.
4. To transact any other Business which is brought under consideration by the Directors' Report, and for any other Business of the Company.

The London Transfer Registers of the Company will be closed from the 24th to the 29th April, 1916, both days inclusive, and the Head Office Transfer Registers will be closed from the 22nd May, to the 9th June, 1916, both days inclusive.

Holders of Share Warrants to Bearer wishing to be present or represented at the Meeting must deposit their share warrants, or may at their option produce same, at the places and within the times following:—

- (a) At the Head Office of the Company in Johannesburg, at least twenty-four hours before the time appointed for holding the Meeting.
- (b) At the London Office of the Company, Salisbury House, London Wall, E.C., on or before the 27th April, 1916.

By Order of the Board,

H. G. L. PANCHAUD, Secretary.

Head Office, Johannesburg,  
3rd February, 1916.

## Marievale Nigel Gold Mines & Estates, LIMITED.

(Incorporated in the Transvaal.)

### NOTICE TO SHAREHOLDERS.

NOTICE IS HEREBY GIVEN that the Nineteenth Ordinary General Meeting of Shareholders in the above-named Company will be held in the Board Room, Cullinan Building, Johannesburg, on Friday, 12th May, 1916, at 11.30 a.m.

#### BUSINESS:

1. To receive the Balance Sheet, Reports, etc., for the year ended 31st December, 1915.
2. To elect Directors in the place of the present Board, who retire in terms of the Company's Articles of Association, but are eligible, and offer themselves for re-election.
3. To appoint Auditors in the place of Messrs. C. L. Andersson and Co. and Mr. G. H. Pemberton, who retire, but are eligible for re-appointment, and to fix their remuneration for past services.
4. To transact any other business which may be transacted at an Ordinary General Meeting, or which is brought under the consideration of the meeting by the Report of the Directors.

The London Transfer Registers of the Company will be closed from the 10th to the 15th April, 1916, both days inclusive, and the Head Office Transfer Registers will be closed from the 8th to the 26th May, 1916, both days inclusive.

Holders of Share Warrants to Bearer desiring to vote must deposit their Share Warrants at the Head Office of the Company, Johannesburg, at least twenty-four hours before such General Meeting, or at the London Office of the Company, Salisbury House, London Wall, E.C., on or before the 13th April, 1916, together with a statement in writing of the name and address of the holder of the Warrants, in exchange for which a certificate will be given entitling the holder to attend and vote at the meeting in respect of the shares specified in such receipt.

By Order of the Board,

H. G. L. PANCHAUD, Secretary.

Head Office, Johannesburg,  
9th February, 1916.

**New Kleinfontein Company, Ltd.**

(Incorporated in the Transvaal.)

**NOTICE TO SHAREHOLDERS.**

**NOTICE IS HEREBY GIVEN** that the Twentieth Ordinary General Meeting of Shareholders in the above-named Company will be held in the Board Room, Fourth Floor, National Bank Buildings, Simmonds Street, Johannesburg, on Saturday, the 27th day of May, 1916, at 11 a.m.

**BUSINESS:**

1. To receive and consider the Statements of Accounts and the Reports of the Directors and the Auditors for the year ended 31st December, 1915.
2. To elect two Directors in place of Messrs. J. H. Ryan and E. H. Read, who retire in terms of the Company's Articles of Association, but who are eligible and offer themselves for re-election.
3. To appoint Auditors for the ensuing year, and to fix the remuneration of the retiring Auditors, Messrs. F. W. Diamond & English, and C. L. Andersson & Co.
4. To transact all such other business as may, under the Articles of Association, be transacted at an Ordinary General Meeting.

The Transfer Register of the Company will be closed from the 26th day of May, 1916, to the 11th day of June, 1916, both days inclusive.

Holders of Share Warrants to Bearer desiring to be present or represented at the Meeting, must produce their Share Warrants at the places and within the times mentioned below:—

- (a) At the Head Office of the Company, National Bank Buildings, Simmonds Street, Johannesburg, at least twenty-four hours before the time fixed for the Meeting.
- (b) At the Offices of the Company in London, 208-224, Salisbury House, Finsburg Circus, E.C., at least thirty days before the date fixed for the holding of the Meeting.
- (c) At the Offices of the Paris Agents of the Company, "Credit Mobilier Francais," 30-32, Rue Taibout, Paris, at least thirty-five days before the date fixed for the holding of the Meeting.

By Order of the Board,

GEO. W. AUSTIN, Acting Secretary.

Head Office: National Bank Buildings,  
Simmonds Street, Johannesburg,  
10th March, 1916.

**The Luipaard's Vlei Estate and GOLD MINING CO., LIMITED.**

(Incorporated in England.)

**NOTICE TO SHAREHOLDERS.**

**NOTICE TO SHAREHOLDERS.**—Notice is hereby given that an Interim Dividend of Sixpence (6d.) per share, less Income Tax (making a distribution of 1s. 3d. per share during the current financial year) has been declared payable to Shareholders registered in the books of the Company on the 1st April, 1916.

Warrants in payment of the dividend will be issued from the Head Office of the Company on the 28th April, 1916.

By Order of the Board,

ARNOLD F. BAYNES, Secretary.  
10 and 11, Austin Friars, London, E.C.; 16th March, 1916. 33315

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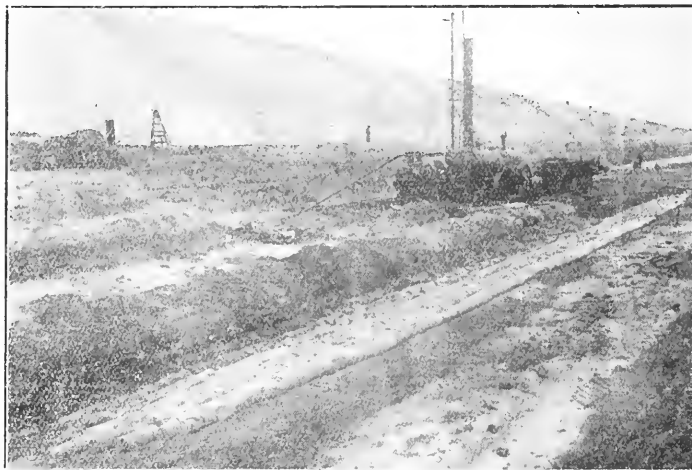
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